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EXCITATORY AND INHIBITORY CLASSICAL CONDITIONING OF VICTIMS IN HUMAN AGGRESSION

by

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A THESIS

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ABSTRACT

The purpose of the dissertation was to apply excitatory and inhibitory classical conditioning paradigms to the study of human aggression. Accordingly, receiving provocation from another person was considered as equivalent to positive contingencies between a CS^+ (provoking individual) and US (antecedent aversive stimuli). Hence, the CS^+ person was assumed to elicit conditioned negative affect, thereby facilitating aggression against this target. The failure to receive US from a second person in a situation in which provocation is given by a CS^+ was conceptualized as equivalent to negative contingencies between a CS^- (nonprovoking individual) and US. Consequently, the CS^- person was assumed to elicit conditioned positive affect, thereby inhibiting aggression against the CS^- target.

Four experiments were conducted to assess the validity of these two forms of target conditioning. In each study, participants could respond aggressively by administering noxious stimuli (95 dBA white noise) to three targets. These targets were respectively defined as a CS^+, a CS^-, and as a neutral CS^o by systematically varying whether the participants had received US (95 dBA tones) from these persons.

The target conditioning procedures of Experiment 1 and 2 were each based on the principles of excitation and differential inhibition. The CS^+ target was defined by having participants receive the US on 50% of the time that CS^+ had the opportunity to do so. The CS^- target had a similar

opportunity to deliver US to participants, but never did so. The third target was retained as a neutral CS^o by not providing any opportunity for this person to deliver US. The effects of these procedures on aggression were assessed using a direct testing method in Experiment 1, in which changes in the participants' rate of aggression to CS^+ and CS^- were each compared to CS^o. In Experiment 2 a "summation" testing method was employed, in which the participants could harm more than one target at the same time. Differences in aggression among the various target combinations were then compared in order to assess whether the simultaneous harming of CS^+ or CS^- along with another target respectively increased or decreased aggression. Analysis of the aggression data of each study supported all predictions related to both forms of target conditioning.

The target conditioning procedures of Experiments 3 and 4 were each based on the principles of excitation and conditioned inhibition. Participants did not receive any US when both CS^+ and CS^- had the opportunity to deliver US, but were given US on 50% of the time that CS^+ could do so by himself. The third target was again retained as a CS^o. The effects of these procedures on aggression were assessed by the direct testing method in Experiment 3 and by the summation method in Experiment 4. The results of Experiment 3 only provided support for excitatory conditioning, while those of Experiment 4 only supported the predictions based on inhibitory conditioning.

In all studies, evidence was found for predicted negative affect to CS^+, but not for the predicted positive affect to CS^-.

This problem was discussed in terms of the methodological limitations of the affect scales used in this research. The overall findings of these experiments were viewed as providing partial support for the proposed target conditioning analyses and were discussed in terms of possible extensions to the social learning analysis of aggression.

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EXCITATORY AND INHIBITORY CLASSICAL CONDITIONING OF VICTIMS IN HUMAN AGGRESSION

One of the major current theoretical perspectives in the area of human aggression is learning. Although not explicitly considered in the influential frustration-aggression theory (Dollard, Doob, Miller, Mowrer, & Sears, 1939), the application of learning models in this area has since become quite extensive (e.g., Bandura, 1973; Berkowitz, 1974; Buss, 1971; Patterson & Cobb, 1973; Ulrich, Dulaney, Arnett & Mueller, 1973). As was noted by Berkowitz (1973), however, consideration of learning models in the study of aggression has been largely restricted to instrumental learning conceptualizations, with relatively little attention having been given to classical conditioning.

It is argued in this thesis that the classical conditioning paradigm can serve as a basis for conceptualizing how antecedent aversive stimuli, such as attack or frustration, can facilitate subsequent aggressive behavior against the provoking individual. Although it has been demonstrated (Bandura, 1973, pp. 155-174) that these antecedent aversive stimuli reliably elicit anger that can facilitate aggressive behavior, this common phenomenon has previously not been explicitly conceptualized in terms of classical conditioning. As is discussed subsequently, being attacked or frustrated by a provoker can

be considered in terms of a classical conditioning paradigm in which the provoking individual becomes established as a conditioned stimulus (CS) for anger (conditioned response, CR). This conditioning is assumed to occur because of the provoker's (CS) association with attacks or frustrations which are considered as unconditioned stimuli (US). While a similar conceptualization was implied by Miller (1948) and Toch (1969), their focus was upon the Pavlovian principle of stimulus generalization to account for target displacement, rather than upon the process of conditioning itself. The conditioning analysis being proposed in this thesis was also implied by Berkowitz (1974, p. 174) and Bandura (1973, pp. 44-45), but its implications have not been fully considered.[1] Therefore, the present conceptualization of provocation in terms of classical conditioning is expected to extend the role of this learning model in the area of aggression.

The Target Conditioning Model

According to the classical conditioning paradigm, any stimulus that is adequate to elicit reliably a response (UR) can be considered as a US; furthermore, a previously neutral stimulus that is paired or associated with the US should become a CS now capable of eliciting a CR. It is argued in this thesis that being attacked or frustrated by another person can be conceptualized in terms of a conditioning paradigm. Accordingly, antecedent aversive stimuli such as attack or frustration can be considered as functionally equivalent to

US since they have been shown to elicit reliably the emotional response of anger (UR). Therefore, because of its association with the US, the provoking individual should no longer be a neutral stimulus, but should become conditioned as a CS now capable itself of eliciting anger as a CR.[2] This conceptualization of provocation as being equivalent to CS (provoker) - US (antecedent noxious events) pairings has previously not been made explicit in the aggression literature. While a similar conceptualization was recently proposed by Reiter and McEvoy DeVellis (1976) in a study dealing with conditioned emotional responses, they did not extend their analysis to aggression. Instead, these authors only considered response suppression within the conditioned emotional response (CER) paradigm.

The conditioning analysis of provocation being proposed in this thesis maintains that a person who has been attacked or frustrated by another individual will learn, through classical conditioning, to be angry at that individual (CS). Since it has been demonstrated (e.g., Bandura, 1973) that anger can increase the probability of aggression, then it can be assumed that conditioned anger (CR) should also have a facilitative influence on overt aggression. By focussing on the conditioned anger (CR) elicited by the provoker (CS) rather than on the anger (UR) directly elicited by attack or frustration (US), the present analysis provides a theoretically explicit basis

for specifying the role of the particular target of aggression following provocation. The present analysis predicts that aggression should not be indiscriminate following attack or frustration, but should be more likely to be victim-specific to the person (CS) who had been associated with the antecedent harm (US). Although the prediction of greater aggression against the provoking individual is not novel in itself since it was first proposed in the frustration-aggression hypothesis (Dollard et al., 1939), target conditioning has seldom been noted as the basis for this prediction. As is discussed in the following section, however, the existing research cannot serve as direct evidence for the present target conditioning analysis.

The Problem

Although it has been amply demonstrated that antecedent aversive stimuli can faclitate aggression (Bandura, 1973, pp. 155-174), these findings cannot be used as direct evidence for the target conditioning model. In the traditional aggression research paradigms (e.g., teacher-learner paradigm, see Buss, 1961; Sanders & Baron, 1975), a research participant usually interacts with a person (confederate) who provokes him in the experimental conditions or does not provoke him in the control conditions. The effects of these procedures on subsequent aggression are then assessed by giving the research participants an opportunity to respond aggressively to their partner (no harm is actually received by the confederate-partner). However,

this partner is generally the only target available to the participants. Therefore, the usual comparison made between the levels of aggression in the experimental and control conditions does not necessarily indicate that the provoked participants were more aggressive to their provoker (CS) than to other possible targets should they also have been available. For example, the antecedent aversive stimuli (US) could have simply increased generalized arousal (Bandura, 1973) among experimental participants, thereby increasing their level of aggression to all available targets. Consequently, it is necessary that other targets be available in addition to the provoker (CS) in order to distinguish generalized arousal effects from those due to target conditioning.

In addition, the results of previous aggression research cannot be considered as direct support for the target conditioning model because excitatory conditioning may have been confounded with inhibitory conditioning (cf., Rescorla, 1967, 1969). Excitatory conditioning is based upon positive CS-US contingencies (CS is paired or closely followed by the US). On the other hand, inhibitory conditioning is based upon negative contingencies between another CS (CS^-) and the same US as was used for the excitatory conditioning (CS^- is followed by the absence of the US); furthermore, a CS^- can be assumed (Rescorla, 1969) to elicit a tendency directly opposite to that elicited by the excitatory CS (CS^+). The consideration of the target conditioning model up to this point in this thesis has

been based only on the application of the Pavlovian excitatory principle, since receiving antecedent harm (US) from another person (CS^+) can be considered as equivalent to positive CS-US contingencies. Similarly, however, it may be argued that a second person who does <u>not</u> administer antecedent harm (US) under similar conditions may become established as a CS^-. This latter situation can be conceptualized as equivalent to negative CS-US contingencies. Therefore, inhibitory target conditioning may have occurred in the "control" conditions of most previous research. The research participants in these conditions were not harmed despite having been informed that their partner (confederate) could have done so (i.e., to keep the situation comparable to the experimental conditions). Consequently, the target in the control conditions may have functioned as a CS^- because he was explicitly associated with the absence of antecedent harm (US). Furthermore, since a CS^+ target is assumed to elicit negative emotional responses such as anger that can facilitate aggression, a CS^- target can be assumed to elicit opposite emotions (positive affect) that should actively reduce or suppress aggression to that target. Hence, the conventional comparison made between the provoked participants' aggression with that of participants who had not been provoked cannot be considered as due solely to conditioned negative affect to CS^+ (excitatory effect). Part of the differences in aggression may have been due to inhibitory effects elicited by the target (CS^-) in the "control" conditions.[3]

This problem is similar to that of the "explicitly unpaired" CS as control in classical conditioning. As was noted by Rescorla (1967, 1969), the level of conditioning resulting from CS-US pairings cannot be demonstrated adequately if the CRs to this CS (CS^+) are compared to those elicited by a "control" stimulus that had been negatively correlated with the US. Similarly, if the inhibitory conditioning conceptualization suggested in this thesis is valid, then it is necessary to compare the level of aggression to a provoker (CS^+) with that to a truly neutral target (CS^o) who had not been associated at all with the US, rather than to one (CS^-) who had been negatively associated with it.

Present Studies

The target conditioning model of this thesis predicts that a target may function either as a CS^+ or as a CS^-, depending upon whether it had been positively or negatively associated with antecedent aversive stimuli (US). In particular, it was predicted on the basis of the principle of excitation that a target who is positively associated with antecedent harm US should become a CS^+ that elicits negative emotional responses (CR), thereby facilitating aggression to this target. On the other hand, Pavlovian principles of inhibition were used to predict that another target who is negatively associated with the US should become a CS^- that

elicits positive affect, thereby suppressing agression to that target. The present research studies were designed to assess the validity of these predictions.

The predicted effects of both forms of target conditioning were assessed in each of four experiments in the present research program. In each study, all subjects were provided with three targets, a CS^+, a CS^-, and a neutral CS^o who had not been associated whatsoever with antecedent harm US. The CS^+ target was defined on the basis of the Pavlovian principle of excitation in all studies, whereas the CS^- target was defined on the basis of the Pavlovian principle of differential inhibition in the first two experiments, and of conditioned inhibition in the third and fourth experiments (cf., Church, 1971, p. 710;Rescorla & Solomon, 1967, p. 171). These two principles of inhibition have been strongly supported in the classical conditioning literature (Maier et al., 1969; Rescorla & Solomon, 1967), and were therefore both examined in the present research in order to assess the generality of inhibitory conditioning of targets. Although experiments 2 and 4 were essentially replication studies of Experiments 1 and 3 respectively, they were based on different testing methods in order to assess the reliability of the findings from Experiments 1 and 3.

Experiment 1

According to the Pavlovian principles of excitation and

differential inhibition, a stimulus that is repeatedly paired with a US should become a CS^+, whereas a stimulus that is repeatedly presented unpaired with the same US during the conditioning phase should become a CS^-. Hence, participants in the present experiment were consistently given aversive stimuli (US) by one person who was then defined as a CS^+ and were never given the US in the same situation by a second person who was thereby defined as a CS^-. On the other hand, the third CS^o target was retained as a neutral target person by not having this person interact with participants during the conditioning phase of the experiment.

The effects of these conditioning procedures on behavior were then assessed by a direct testing method. All participants were provided with a socially sanctioned opportunity to aggress against each of the three target persons both before, as well as after the classical conditioning phase of the experiment. Since CS^+ was assumed to elicit anger CRs that should facilitate aggression, it was predicted that more aggression would be expressed against CS^+ than to CS^o after the conditioning phase. Similarly, since CS^- was assumed to elicit opposite emotions to anger, i.e., positive affect that should actively inhibit aggression, it was predicted that less aggression would be expressed against CS^- than to CS^o following the conditioning. Therefore, differences between CS^+ and CS^o were assumed to reflect excitatory

conditioning effects, whereas differences between CS^o and CS^- were assumed to reflect inhibitory conditioning effects.

Furthermore, it was possible to predict from the Pavlovian principles of induction that the particular sequence in which the CS^+ and CS^- targets were presented after the conditioning phase would affect the level of aggression to these targets. Induction was first described by Pavlov to refer to presumed aftereffects following the termination of a CS^+ or CS^- (Rescorla, 1969, p. 84). According to the principle of positive induction, the CR normally elicited by a CS^+ should be enhanced if the CS^+ was immediately preceded by a CS^-. This was assumed to result because the removal of a CS^- was supposed to produce an aftereffect opposite to the inhibitory reaction which would then summate with the excitatory CR when the CS^+ was then presented. Conversely, according to the principle of negative induction, the inhibitory reaction normally elicited by a CS^- should be increased if the CS^- was immediately preceded by a CS^+. This was assumed to occur because the removal of a CS^+ should produce an aftereffect opposite to the excitatory CR that would subsequently summate with the inhibitory reaction when the CS^- was then presented.

Although very little empirical support has been obtained for these induction principles in the classical conditioning literature (Maier et al., 1969, pp. 311-312; Rescorla &

Solomon, 1967, p. 176), the order in which the CS^+ and CS^- targets were presented in the present experiment was systematically varied in order to assess the predictions that could be made from these principles. The principle of positive induction suggests that the presence of a CS^- target immediately before a CS^+ target should produce an "overshooting" effect to the CS^+ target. Conversely from negative induction, the inhibitory tendencies to a CS^- target may be expected to increase if a CS^+ target had been present immediately before it. Therefore although such target contrast effects have not been previously considered in the aggression literature, it was predicted on the basis of the principle of positive induction that the level of aggression to the CS^+ target immediately following the presentation of the CS^- target would be greater than that expressed to CS^+ when it was not immediately preceded by the CS^- target. On the other hand, it was predicted on the basis of the principle of negative induction that less aggression would be expressed against the CS^- target if CS^- had been immediately preceded by the CS^+ target than when CS^- had not been directly preceded by the CS^+ target.

Experiment 2

As in the first experiment, the conditioning procedures in the second experiment were based on the Pavlovian

principles of excitation and differential inhibition to establish a target person as a CS^+ and another as a CS^-. All aspects of the present experiment were identical to those of Experiment 1, with the exception of the testing method used to evaluate the effects of the hypothesized conditioning. Rather than directly comparing the level of aggression to each of the three targets following the conditioning phase in the present study, the effects of conditioning on behavior were assessed by a "summation" technique similar to that described by Rescorla (1969) which requires the presentation of compound CSs. This method is one of the effective techniques reported by Rescorla for measuring inhibitory conditioning. It is based on the proposition that since the effects of a CS^+ and a CS^- are assumed to summate negatively, the simultaneous presentation of CS^+ and CS^- should reduce the response that is normally elicited to CS^+ alone. Therefore, in the summation method inhibitory conditioning is assessed by demonstrating that the CR elicited to CS^+ is reduced by the simultaneous presentation of the compound $CS^+ + CS^-$. Furthermore, this reduction should be greater than that to the compound $CS^+ + CS^o$ (e.g., since a neutral CS^o presented in conjunction with CS^+ may also reduce the CR because of attention factors, then the reaction to CS^+ should be inhibited to a greater extent by CS^- than by a CS^o).

In order to assess the effects of both excitatory and inhibitory conditioning of targets with this method in the present study, the participants' opportunity to aggress following the conditioning phase was such that their responses could harm more than one target at the same time. Hence the following target combinations were presented in a counter-balanced sequence: CS^+ alone; $CS^+ + CS^-$; $CS^+ + CS^o$; and $CS^- + CS^o$. First, although the simultaneous presentation of the CS^o target with CS^+ (i.e., the $CS^+ + CS^o$ compound) could reduce aggression compared to CS^+ alone because two persons would then be harmed, it was expected that a greater reduction would occur when the other person to be harmed along with CS^+ was the hypothesized inhibitory CS^-. Therefore, while more aggression may be expressed to CS^+ than to the $CS^+ + CS^o$ compound, it was predicted that significantly less aggression would be directed toward $CS^+ + CS^-$. Secondly, since the only difference between the target combinations $CS^+ + CS^o$ and $CS^+ + CS^-$ was whether CS^o or CS^- would also be harmed along with CS^+, it was predicted that the hypothesized inhibitory capacity of CS^- compared to CS^o would result in less aggression being expressed to $CS^+ + CS^-$ than to CS^+ to CS^o. On the other hand, since the only difference between the target combinations $CS^+ + CS^-$ and $CS^- + CS^o$ was whether CS^+ or CS^o would also be harmed along with CS^-, it was predicted that the hypothesized

excitatory capacity of CS^+ compared to CS^o would result in more aggression being expressed to $CS^+ + CS^-$ than to the $CS^- + CS^o$ compound.

Experiment 3

The procedures used to establish the CS^+ and CS^- targets in this study were based on the Pavlovian principles of excitation and conditioned inhibition, which involve compound CSs during the conditioning. According to these principles, if a stimulus (S_1) is repeatedly paired with a US, and a compound stimulus involving that stimulus together with another stimulus ($S_1 + S_2$) is repeatedly presented unpaired with the same US during the conditioning phase, then the first stimulus (S_1) should become a CS^+ and the second stimulus (S_2) should become a CS^-. Hence, subjects in the present experiment were consistently given aversive stimuli (US) by one person who was then defined as a CS^+, and were never given the US by either the CS^+ or a second person during those times when both had the opportunity to do so during the conditioning phase. The second person was thereby defined as a CS^-, and as in the previous experiments, a third person was retained as a CS^o by not involving CS^o during the conditioning phase of the experiment.

The effects of these conditioning procedures on aggression were then assessed by the same direct testing method used in Experiment 1. Since all aspects of the present study were

identical to those of the first experiment except for the manner in which CS^- was established, the same conditioning and induction predictions were therefore made in Experiment 3.

Experiment 4

The conditioning procedures in this study were also based on the Pavlovian principles of excitation and conditioned inhibition used in Experiment 3. However, the effects of the hypothesized conditioning on aggression were presently assessed by the summation method used in the second experiment. Since all aspects of the present study were identical to those of Experiment 2 except for the conditioning procedures, the predictions of that study were again advanced in the present experiment.

EXPERIMENT I

In the first experiment, an attempt was made to establish one target as a CS^+ and another as a CS^- based on the Pavlovian principles of excitation and differential inhibition. To determine the effects of these procedures, the levels of aggression to these two targets were then directly compared with the aggression to a third, neutral target, CS^o.

Method

Subjects

The subjects were 16 male, and 16 female students from introductory psychology who participated in the experiment as part of their course requirement. The subjects participated in same-sex groups of four, and one group of males and of females was randomly assigned to each of the four order of target conditions.

Apparatus

Each of four adjacent experimental rooms (2.14 m by 2.44 m) contained a pair of finger electrodes that ostensibly measured galvanic skin responses (GSRs), a set of stereo headphones (Jana, Model BJ-2004, frequency response 20-18,000 Hz) through which part of the instructions and the aversive auditory stimuli were administered, and a console labeled No. 4 that

contained a response button and a total of five lights. Three of the console's lights were designated as OTHERS and labeled 1, 2, 3, representing the subjects ostensibly in the other three conditions. The other two lights, labeled RECEIVE and GIVE, respectively, signaled when the subject could receive or give the aversive auditory stimuli. Subjects were instructed that they could only press their response button when the GIVE light was illuminated, and were led to believe that each response would deliver a .5 sec burst of loud white noise to the person, or persons, specified by the OTHERS lights. Thus by simultaneously illuminating at least one of the OTHERS lights whenever the GIVE light was on, the experimenter was able to vary the subject's opportunity to harm the three supposed targets. Similarly, by simultaneously illuminating at least one of the OTHERS lights whenever the RECEIVE light was on, the experimenter was able to vary each target's association with any harm received by the subject.

The remainder of the apparatus was situated in another room located across the hall. The programming equipment consisted of a Computer Mechanism Corporation Tape Reader (Model 18, 24 VDC) and custom-built integrated circuit logic modules. By using a different punched paper tape for each experimental condition, this equipment controlled the illumination of the lights on each subject's console,

performed the switching for the delivery of aversive auditory stimuli to the subjects, and transmitted electronic signals to the data recording equipment to identify each target and the subject's responses. This recording equipment consisted of two 4-channel Lehigh Valley event recorders interconnected so as to provide a record on moving paper of each subject's rate of responding (button press) to each target. A Sony Corporation stereo tape recorder (Model TC-630) was used to administer taped soft music and part of the instructions through the subjects' headphones. Custom-built white noise (95 dBA), and pure-tone (95 dBA, 1000 Hz) generators were used to administer the aversive stimuli to subjects.

Since the purported purpose of the experiment was to study physiological responses, the experimenter wore a white lab coat during the experiment in order to increase authenticity. Also, several pieces of physiological equipment (e.g., polygraph) were arranged in an adjoining room and were visible to subjects when they entered the laboratory.

Procedure

Each group of four subjects was met by the male experimenter who explained that the experiment was concerned with physiological reactions to different kinds of auditory stimuli (see Appendix A for complete instructions). The subjects were informed that loud white noise and tones were

involved, and that their galvanic skin responses and/or blood pressure would be measured to determine their reactions to these sounds. After assuring the subjects that these sounds would be safe, although aversive, the experimenter then introduced the pretext for requiring the subjects to give these aversive sounds to each other.

It was explained that the experiment was designed to test the "cognitive mediation hypothesis of physiology," which was said to predict that a person's physiological reactions would be similar when he gave an aversive stimulus to someone else as when he received it himself. This was said to occur because the person giving the aversive stimulus would imagine the reactions of the other person, and hence, that this cognition would mediate his own physiological reactions. As one of the examples of this, the experimenter noted that a person should react with a similar pattern of physiological reactions (although probably of smaller magnitude) if he had to inject a needle into someone else's arm as when he received it himself. Since most subjects readily understood this example, the experimenter then stated that the experiment would be quite similar, except that loud aversive sounds would be used instead of a needle.

Subjects were then informed that four different experimental conditions were involved, ostensibly one for

each person, and depending upon their particular condition, that either their GSRs or blood pressure would be measured both when they received, and when they gave the loud sounds to each other. After assuring the subjects that they could withdraw from the experiment at any time and having obtained their consent to participate, the subjects were then asked to each choose one of four adjoining experimental rooms, ostensibly to ensure random assignment of subjects to the four experimental conditions. In actual fact, each room contained apparatus and printed instructions which led each subject to believe that he (she) was in Condition No. 4 and that the others were in Conditions 1, 2 and 3. Thus by having all subjects believe that they were in Condition No. 4, the experimenter was later able to manipulate systematically both the subjects' opportunity to aggress against each of three supposed targets, and also each target's association with antecedent aversive stimuli (US).

The experimenter then entered each room in turn, informed each subject that GSRs would be recorded as part of Condition No. 4, and connected bogus GSR electrodes to the subject's nonpreferred hand. Each subject was then told that specific task instructions would shortly be administered over the headphones, and was instructed to place these on and to first listen to the music and relax, ostensibly so that their GSR base rate could be measured.

To ensure uniformity, the task requirements were then described by a tape recording relayed over the subjects' headphones. The experimenter's voice explained that the four conditions would differ in that the person in Condition 1 would have only his blood pressure recorded, that both GSRs and blood pressure would be recorded in Condition 2, and that only GSRs would be recorded in Conditions 3 and 4. Moreover, in explaining the function of the consoles, it was explained that the people in Conditions 1, 2, and 3 would be giving loud tones whenever they pressed their response buttons, and that the duration of the tones would depend upon how long they held their response buttons down, so that ostensibly these subjects were free to vary the frequency and the duration of their responses. On the other hand, it was explained that the person in Condition 4 would deliver a .5 sec burst of loud white noise each time he (she) responded, and that while the duration of the white noise could not be varied, the frequency of responding nevertheless could be varied. The reason for letting the subjects decide when to respond was said to be based on the "cognitive mediation hypothesis" which supposedly predicted that a person should only respond physiologically when giving aversive stimuli to others if he or she was actively thinking about the stimuli. Thus it was noted that making the subjects

decide for themselves when to respond, or for how long to respond in Conditions 1, 2, and 3, would thereby force them to actively think about the loud noise they were giving. The experimenter then suggested that they should vary how often they responded, and that those in Conditions 1, 2, and 3 should also vary the duration of their responses. This suggestion was made to prevent the subjects from thinking that they were expected to respond equally to all targets, and hence, provided for a socially sanctioned context for the subjects to harm some of the targets more than others if they so desired.

Presumably in order to obtain an index of the subject's physiological reactions, and also to let the subjects know the nature of the aversive stimuli, the experimenter then administered a .5 sec burst of white noise and of tone. The experimenter then saw each subject in turn and answered any questions by reiterating portions of the previous instructions. After ensuring that each subject understood the task, the experimenter randomly assigned the group of subjects to one of the four order of targets conditions, placed the corresponding paper tape in the tape reader, and then activated the programming equipment to begin the behavioral portion of the experiment.

Phase I. The base rate of aggression to each of the three supposed targets (X1, X2, X3) was assessed during the first phase of the experiment. This was done by illuminating the OTHERS lights 1, 2, and 3 in turn for one minute each, and by simultaneously illuminating the GIVE light. Each subject was free to press the response button as often as he (she) wanted to whenever the GIVE light was on, and was led to believe that each response would deliver a .5 sec burst of loud white noise to the person specified by the illuminated OTHERS light. The number of responses to each target served as the measure of aggression.

Phase II. The first phase was followed by a one minute period where all lights on each subject's console were off, ostensibly representing a time period when others were giving and receiving aversive stimuli. This was followed by the conditioning phase, where the Pavlovian principles of excitation and differential inhibition were used to establish X1 as a CS^{+} and X2 as a CS^{-}. The RECEIVE light was illuminated for four minutes while the OTHERS lights 1 and 2 were each illuminated for a total of two minutes. The sequencing of the OTHERS lights followed a fixed, randomly determined pattern of 30 sec segments (X1 for 30 sec, followed by X2 for 30 sec, then X1 for 60 sec, X2 for 30 sec, X1 for 30 sec, and X2 for 60 sec). Each subject was led to believe that the

person indicated by the <u>OTHERS</u> light was free to deliver the loud tone while the <u>RECEIVE</u> light was illuminated. Thus X1 was defined as a CS^+ by having subjects receive the loud tone (US) on 50% of the two minutes that the <u>OTHERS</u> light <u>1</u> was on (US duration ranged from 2 to 9 sec, median 5 sec). On the other hand, X2 was defined as a CS^- by not administering any tones while the <u>OTHERS</u> light <u>2</u> was on. X3 was retained as a CS^o by not illuminating the <u>OTHERS</u> light <u>3</u> during this phase of the experiment. From these procedures, therefore, the subjects were led to believe that X1 had given them the tone on 50% of the time that X1 had the opportunity to do so, and that X2 had not given them any tones during a similar opportunity. X3, on the other hand, was made to be perceived as not having been given any chance to administer harm.

<u>Phase III</u>. The third phase of the experiment then followed immediately afterwards, and constituted the testing phase of the experiment. This was similar to Phase I except that the order in which the targets were presented was varied according to the four order conditions so as to assess the predictions from the induction principles. As in Phase I, the <u>OTHERS</u> lights <u>1</u>, <u>2</u>, and <u>3</u> were each illuminated in turn for one minute while the <u>GIVE</u> light was on. The order in which the targets were presented was CS^+, CS^-, followed by CS^o for the subjects assigned to order 1. In order 2, the sequence

was CS^o, CS^+, and CS^-; in order 3, the sequence was CS^-, CS^+, and CS^o; and in order 4, the sequence was CS^o, CS^-, and CS^+.

The third phase was followed by a one minute period when all lights on each subject's console were off, again presumably indicating that the others were then giving and receiving aversive stimuli. Soft music was then played over the subject's headphones while the experimenter entered each room in turn, and indicated that the experiment was over but that it was necessary to again measure the subject's base rate GSRs. Each subject was then asked to complete a brief questionnaire while his (her) GSRs were ostensibly being measured. Embedded within several masking items, the questionnaire (see Appendix B) contained items designed to determine the extent of suspiciousness, as well as items to measure the level of anger and general affect to the three other persons. The experimenter then left the room and reentered when each subject had finished the questionnaire. The electrodes were then disconnected, and the subject's responses to the suspiciousness questions were followed up during the ensuing debriefing period. The debriefing included printed as well as a verbal explanation of the true purpose of the study and of the nature and indispensability of the experimental deception.

Results and Discussion

Postexperimental Questionnaire

The subjects' perceptions and affect during the experiment were assessed through a series of 7-point bi-polar scales. First of all, in order to determine the perceived aversiveness of the loud tone and white noise, subjects rated how bothersome (with 1 indicating "very bothersome", and 7 as "not bothersome at all") they would find each stimulus if they had to listen to these for a one minute period. The mean rating to the tone was 2.91 and that to the white noise was 3.72 thus indicating that both stimuli were perceived as somewhat aversive. Second, in order to assess the effects of the conditioning procedures on affective responses, the postexperimental questionnaire included five affect scales which subjects completed with respect to each target person. The results on these scales were then summed to yield a composite affect score towards each of the three targets (see Appendix C). These mean ratings are presented in Table 1.

The summed affect scores were analyzed according to a split-plot factorial analysis of variance design, consisting of two levels of sex and four levels of order of targets as between-subjects factors, and three levels of targets as the within-block factor. The results revealed significant

Table 1

Mean Affect Ratings in Experiment I

Target	Measure of Affect					
	Relaxation	Anger	Guilt	Happiness	Upset	Summed
CS^+	2.44	3.75	2.59	2.94	3.59	15.31
CS^o	4.91	6.19	3.28	4.53	5.47	24.38
CS^-	5.22	6.56	3.34	4.53	5.69	25.34

Note. Lower scores indicate more negative affect.

main effects for targets, F (2, 48) = 58.88, $p < .01$, and for order of targets, F (3, 24) = 3.19, $p < .05$. No other significant effects were found.

The relationship among the means of the summed affect scores to each target were as predicted, in that subjects reported more overall negative affect to the CS^+ target (M = 15.31) and the least to CS^- (M = 25.34). As a further test of the significant target main effect, however, comparisons of each of these means to CS^o (M = 24.38) using Dunnett's test for comparisons to a control mean (Kirk, 1969, p. 94) indicated that only the difference between CS^+ and CS^o was significant, d' (3, 48) = 2.00, $p < .05$. Therefore, this indicated the presence of excitatory but not of inhibitory conditioning effects on this measure of affect.

The mean summed affect scores for the target orders 1 through 4 were 22.29, 22.17, 23.25, and 20.00, respectively. As a further test of the target order main effect, multiple comparisons (Newman-Keuls test, see Kirk, 1969, p. 91) between these means revealed that only orders 3 and 4 differed significantly from each other, $p < .05$. More overall negative affect in target order 4 than in order 3 had not been predicted, and could not be explained on the basis of the induction principles since CS^- immediately preceded CS^+ during Phase III for both of these target order conditions.

Dependent Measure of Aggression

The aggression data were expressed in terms of an "aggression ratio," B / (A + B), where A represented the mean base rate during Phase I (mean number of aggressive responses to the three targets), and B represented the response rate to each target during Phase III (see Appendix D). Hence, this ratio provided a measure of relative change in the subjects' rate of aggression between the pre- and post-conditioning phases of the experiment. The values of this ratio could vary from .00 to 1.00, and a value greater than .50 could be interpreted as a relative increase whereas a value less than .50 indicated a relative decrease in the rate of aggression from Phase I to Phase III.

The aggression ratio scores were then analyzed according to a split-plot factorial design, consisting of two levels of sex and four levels of order of targets as between-subject factors, and three levels of targets as the within-block factor. The only effect to attain significance from this analysis of variance was that of targets, F (2, 48) = 7.40, $p < .01$, indicating differences in the mean aggression ratios among the three targets. As shown in Table 2, the largest mean aggression ratio was to the CS^+ target (M = .564) and the least was to CS^- (M = .389). Since a mean aggression ratio of .5 would indicate no change in the subjects' rate of aggression during Phase III relative to their mean base

Table 2

Mean Aggression Results in Experiment I

Target	Measure of Aggression	
	B	B / (A + B)
CS^+	10.750	.564
CS^o	6.156	.475
CS^-	5.594	.389

Mean A = 7.156

Note. A = mean response rate prior to conditioning.
B = response rate following conditioning.

rate, the values shown in Table 1 therefore indicate a pattern of results consistent with the hypothesized excitatory and inhibitory properties of CS^+ and CS^-, respectively. To specifically test for these effects, the mean aggression ratios to CS^+ and CS^- were then each compared with the mean to CS^o using Dunnett's test. Results indicated that both differences were significant, d' (3, 62) = .07, $p < .05$, therefore indicating that both forms of conditioning had in fact been successful.[4]

On the other hand, the predictions based on the principles of induction were not supported. The CS^+ target had been preceded by CS^- during Phase III for the target orders 3 and 4, and had not been for orders 1 and 2, so that more aggression was expected to CS^+ in orders 3 and 4 if positive induction had occurred (i.e., if an enhanced excitatory effect was present in orders 3 and 4). Similarly, more aggression should also have occurred to the CS^- target in orders 3 and 4 than in orders 1 and 2 according to the prediction based on negative induction since the CS^+ target had been present immediately before CS^- in orders 1 and 2, but not in orders 3 and 4, so that less aggression should have occurred to CS^- in orders 1 and 2 (i.e., because of an enhanced inhibitory effect in orders 1 and 2). The failure to support these predictions

was evidenced by the lack of significance for the target order main effect ($\underline{F} < 1$) along with the nonsignificant order x targets interaction, $\underline{F}$ (6, 48) = 1.56, $\underline{p} > .05$. Thus while more aggression had been predicted to both CS^+ and CS^- in orders 3 and 4 than in orders 1 and 2, the averaged mean aggression ratio to the CS^+ target was actually found to be smaller (although nonsignificant, $\underline{t}$ (48) < 1) in orders 3 and 4 ($\underline{M}$ = .55) than in orders 1 and 2 ($\underline{M}$ = .58), which is opposite to that predicted from positive induction. On the other hand, the differences in the mean aggression ratios to the CS^- target were consistent with that predicted from negative induction since the averaged mean ratio to CS^- was indeed smaller (although nonsignificant, $\underline{t}$ (48) < 1) in orders 1 and 2 ($\underline{M}$ = .37) than in the target orders 3 and 4 ($\underline{M}$ = .40).

Therefore, the findings on the aggression measure of this study supported the predictions based on both the Pavlovian principles of excitation and differential inhibition, but failed to support those predictions derived from the principles of induction. The results, however, on the affect measure from the postexperimental questionnaire only provided evidence for the predicted excitatory conditioning of targets.

Subjects not only increased their level of aggression to the CS^+ target relative to CS^o following the conditioning phase of the experiment, but also reported more negative

affect to CS^+. However, while the results on the affect measure were consistent with the predicted conditioning of negative affect to CS^+, the failure to obtain significant differences between CS^- and CS^o on the affect ratings indicated the need for caution in interpreting the effects of inhibitory conditioning to CS^-.

The results on the aggression measure were consistent with the predicted inhibitory effects of CS^- since subjects decreased their level of aggression to the CS^- target relative to CS^o following the conditioning procedures. However, it was predicted that this difference was due to conditioned positive affect to CS^-, but the results on the composite affect measure failed to demonstrate that this had in fact occurred. By definition (Rescorla, 1969), a CS^- should elicit directly opposite tendencies from those elicited by a CS^+. Therefore the subjects' affect ratings to the CS^- person were expected to differ from CS^o in the opposite direction from those to CS^+. Although the difference between CS^- and CS^o target persons was in the proper direction on the summed affect measure, it did not attain statistical significance so that no reliable evidence was found for the hypothesized positive affect to CS^-. The actual basis for the difference in aggression between CS^- and CS^o that were obtained in the present study should be more evident

if the present results are compared with those of the following three experiments since inhibitory conditioning procedures were carried out to a target in each of these experiments. The present effects to CS^- will therefore be further discussed in the General Discussion section of this thesis.

No evidence was found in the present study for the predicted order of target effects that were based on the principles of positive and negative induction. No effects of order were obtained on the aggression measure, and the particular order effect that was found on the affect measure was not consistent with the induction predictions. While the reliability of that particular order effect will be further assessed in light of the findings of subsequent experiments in the present research, it may be noted that the failure to obtain the predicted target contrast effects need not imply a lack of classical conditioning to CS^+ and CS^- since the validity of the principles of induction has not been clearly established in the classical conditioning literature. Little empirical support has been obtained for the induction principles in that literature (Maier et al., 1969, pp. 311-312; Rescorla & Solomon, 1967, p. 176), and as was noted by Rescorla (1969, p. 84), induction is not central to a conceptualization of CS^+ and CS^- effects but

rather is only based upon Pavlov's particular theory of the processes underlying classical conditioning. This will also be further discussed in light of the induction findings in Experiment 3.

EXPERIMENT II

The second experiment was also based on the Pavlovian principles of excitation and differential inhibition. However, compared to the direct testing method of Experiment 1, in the present study the effects of these conditioning procedures on aggression was assessed by using the summation measurement technique.

Method

Subjects

The subjects were 20 male and 16 female students from introductory psychology who participated in the experiment as part of their course requirement. The subjects participated in same-sex groups of four, and one group of males and of females was randomly assigned to each of the four order of target combination conditions. The data from one group of male subjects were discarded because of equipment malfunction during one session of the experiment.

Apparatus

The apparatus was identical to those used in Experiment 1 with the exception of the punched paper tapes used for programming the particular target combinations during Phase III of the present study.

Procedure

With the exception of Phase III, all aspects of the procedure were identical to those of Experiment 1. The same

instructions to subjects were used, the base rate of aggression to CS^+, CS^-, and CS^o was measured in the same manner (Phase I), and the classical conditioning phase of the experiment (Phase II) was identical (i.e., conditioned excitation and differential inhibition). However, the testing phase (Phase III) was now based on the summation technique, which requires the presentation of compound CSs.

The testing during Phase III was accomplished by having the subjects' aggressive responses at times ostensibly harm two targets simultaneously. The subjects had been led to believe that each response when the <u>GIVE</u> light was illuminated would result in the delivery of a .5 sec burst of white noise to whoever was indicated by the concurrent <u>OTHERS</u> lights, and that more than one person would receive the white noise if more than one <u>OTHERS</u> lights were illuminated at the time. Thus the <u>GIVE</u> light was illuminated for four minutes during Phase III, and four target combinations of one minute duration each were defined as follows: combination 1 was the CS^+ alone condition, and was defined by simply having the <u>OTHERS</u> light <u>1</u> on; target combination 2 was the $CS^+ + CS^-$ compound, and was defined by simultaneously illuminating <u>OTHERS</u> lights <u>1</u> and <u>2</u>; combination 3 was the $CS^+ + CS^o$ compound, and was defined by simultaneously illuminating the <u>OTHERS</u> lights 1 and <u>3</u>; and combination 4 was the $CS^- + CS^o$ compound, and

was defined by simultaneously illuminating OTHERS lights 2 and 3.

Since no order effects were predicted in the present experiment, the different order conditions simply counterbalanced the sequence in which the four target combinations were presented. The sequence was combination 1, 2, 3, and 4 for the subjects assigned to order 1; in order 2, the combination sequence was 2, 3, 4, and 1; in order 3, the combination sequence was 3, 4, 1, and 2; and in order 4, it was 4, 1, 2, and 3. The postexperimental questionnaire administered at the termination of Phase III was identical to that used in Experiment 1.

Results and Discussion

Postexperimental Questionnaire

Subjects again rated their perceptions and affect on the same series of 7-point bi-polar scales as used in Experiment 1. The examination of the ratings of how bothersome the tone and white noise were perceived again indicated that each stimulus was felt to be bothersome, in that the mean ratings to the tone (M = 2.03) and white noise (M = 3.12) were both toward the "very bothersome" end of these scales. As in Experiment 1, the ratings of the various affect items toward the three target persons were summed and then analyzed according to a split-plot factorial design,

consisting of two levels of sex and four levels of order as between-subject factors, and three levels of targets as the within-block factor.

The only effect to attain significance from this analysis was a main effect of targets, F (2, 48) = 41.99, $p < .01$. The means of the summed affect scores toward each of the three target persons, along with those of the individual affect scales, are presented in Table 3. As expected, the means of the summed affect measure indicate that the subjects experienced the greatest amount of negative affect towards the CS^+ person (M = 15.44), and the least to CS^- (M = 26.53). As a further test of the target main effect, however, subsequent comparisons (Dunnett's test) of each of these means to CS^o (M = 24.84) yielded only excitatory effects in that only CS^+ and CS^o were found to significantly differ, d' (3, 62) = 2.38, $p < .05$.

Aggressive Ratios

Each subject's mean base rate of aggression (A) during Phase I, along with his (her) rate of aggression (B) to each of the four target combinations during Phase III, were used to compute four aggression ratio scores {B / (A + B)} for each subject. These scores were then analyzed according to a split-plot factorial design, consisting of two levels of sex and four levels of order as between-subject factors, and

Table 3

Mean Affect Ratings in Experiment II

	Measure of Affect					
Target	Relaxation	Anger	Guilt	Happiness	Upset	Summed
CS^+	2.75	3.28	2.22	2.97	4.22	15.44
CS^o	5.28	6.03	3.22	4.63	5.69	24.84
CS^-	5.84	6.44	3.53	4.75	5.97	26.53

Note. Lower scores indicate more negative affect.

four levels of target combination as the within-block factor. Results from this analysis of variance indicated that the only effect to attain significance was that of target combination $\underline{F}$ (3, 72) = 28.28, $\underline{p}$ < .01. The mean values for each combination are presented in Table 4, and indicate differences among the conditions as predicted.

As a further test of the target combination main effect, multiple comparisons (Newman-Keuls test) between each of these means revealed that all differences, with the exception of the comparison between CS^+ and the $CS^+ + CS^o$ compound, were significant, $\underline{p}$ < .05. First, this indicates that while the simultaneous presentation of the target combination $CS^+ + CS^o$ did not result in a significant reduction in aggression from that to CS^+ alone, the mean aggression ratio to the compound $CS^+ + CS^-$ was significantly lower, presumably due to the inhibitory properties of CS^-. Thus, the mere fact that another person would be harmed along with CS^+ did not produce a significant reduction in the subjects' rate of aggression when this other person was the neutral CS^o target, but did so when the other person which would also be harmed was the inhibitory CS^- target, indicating that the subjects' tendency to aggress to CS^o and CS^- was indeed different (i.e., that CS^- had acquired inhibitory properties). Secondly, the fact that the mean

Table 4

Mean Aggression Results in Experiment II

	Measure of Aggression	
Target Combination	B	B / (A + B)
CS^+	10.375	.670
$CS^+ + CS^-$	5.188	.538
$CS^+ + CS^o$	8.438	.645
$CS^- + CS^o$	3.719	.414

Mean A = 5.083

Note. A = mean response rate prior to conditioning.
B = response rate following conditioning.

aggression ratio was significantly less to $CS^+ + CS^-$ than to $CS^+ + CS^o$ also provides further evidence of the inhibitory capacity of CS^- since the only difference between these two target combinations was whether CS^o or CS^- would also be harmed along with CS^+. On the other hand, evidence for the excitatory capacity of CS^+ was obtained in that the mean aggression ratio to the target combination $CS^+ + CS^-$ was found to be significantly greater than to $CS^- + CS^o$. This indicates that CS^+ had acquired excitatory tendencies since the only difference between these two target combinations was whether CS^+ or CS^o would be harmed along with CS^-.

Therefore the same pattern of results was obtained in both experiments dealing with the Pavlovian principles of excitation and differential inhibition. In each experiment, all predicted excitatory and inhibitory conditioning effects of targets were obtained on the aggression measure, but only excitatory effects were found on the affect measure. The support for both forms of target conditioning on the aggression measure in each experiment indicates that these effects are reliable since the present study was designed to replicate both forms of conditioning by using a different testing method from that used in the first experiment. Similarly, however, the same pattern of results on the affect ratings in each experiment also indicates that these

effects are reliable. Therefore, while the facilitative effects of CS^+ on aggression may be interpreted in terms of conditioned negative affect, the opposite does not seem to be the case for CS^- since neither study demonstrated significant differences on the affect measure between CS^- and CS^o. The basis for the effects to CS^- may be further clarified from the results of the following two experiments since these studies were also designed to demonstrate inhibitory effects, but were based on the conditioned rather than the differential inhibition principle. The present results are therefore further discussed in light of the findings of Experiments 3 and 4 within the General Discussion section of this thesis.

EXPERIMENT III

The attempt to establish one target as a CS^+ and another as a CS^- was based on the Pavlovian principles of excitation and conditioned inhibition in the third experiment. The effects of these procedures on aggression were assessed using the same direct testing method utilized in Experiment 1.

Method

Subjects

The subjects were 16 male, and 16 female students from introductory psychology who participated in the experiment as part of their course requirement. The subjects participated in same-sex groups of four, and one group of males and of females was randomly assigned to each of the four order of target conditions.

Apparatus

The apparatus was identical to those used in the previous experiments, with the exception that the punched paper tapes used for programming the stimuli were unique to this study.

Procedure

With the exception of Phase II, all aspects of the procedure were identical to those of Experiment I. The instructions to subjects, the measurement of aggression to CS^+, CS^-, and CS^o during Phase I and III, and the post-experimental questionnaire were exactly as in Experiment 1. However, while the conditioning of X1 as CS^+ during Phase II

was also as in Experiment 1, the procedures used to condition X2 as CS^- were now based on the principle of conditioned inhibition rather than on differential inhibition.

During Phase II, the RECEIVE light was illuminated for four minutes. The sequencing of the OTHERS lights followed the same randomly determined pattern as in Experiment 1, and X1 was again defined as a CS^+ by having subjects receive the tone (US) on 50% of the two minutes that the OTHERS light 1 was on (using the same pattern of US as in Experiment 1). However, on those two minutes where the OTHERS light 2 had been on in Experiment 1, the OTHERS light 1 and 2 were now both on, and again, no tones (US) were administered during this time. The subjects had been led to believe that the simultaneous occurrence of two OTHERS lights during the RECEIVE light meant that both of the indicated others supposedly then had the opportunity to give the subjects the tone. From the procedures, therefore, the subjects were made to feel that neither X1 nor X2 had given them the tone when they both had the opportunity, but that X1 had on 50% of the time that X1 had the opportunity to do so by himself. As in previous experiments, X3 was again retained as a CS^o by not illuminating the OTHERS light 3 during the second phase of the study.

Results and Discussion

Postexperimental Questionnaire

The mean ratings to the tone was 2.50 and that to the white noise was 3.81, again indicating that both auditory stimuli were perceived as somewhat bothersome in this experiment. As in the previous experiments, the ratings of affect to the various target persons were summed and then analyzed according to a split-plot analysis of variance factorial design, consisting of two levels of sex and four levels of order as between-subject factors, and three levels of targets as the within-block factor.

This analysis of the summed affect ratings revealed only a significant main effect for targets, F (2, 48) = 74.88, $p < .01$. As shown in Table 5, this main effect was due to the more negative ratings reported towards CS^+ compared to the other two target persons. The specific comparison (Dunnett's test) of CS^+ (M = 15.16) and CS^- (M = 24.94) to CS^o (M = 24.75) revealed that only the difference between CS^+ and CS^o was significantly different, d' (3, 62) = 1.80, $p < .05$. Therefore as in the other experiments, these results indicated the presence of excitatory but not of inhibitory effects on the affect measure.

Aggression Ratios

The aggression ratios to the three targets were analyzed according to a split-plot factorial design, consisting of two

Table 5

Mean Affect Ratings in Experiment III

	Measure of Affect					
Target	Relaxation	Anger	Guilt	Happiness	Upset	Summed
CS^{+}	2.78	2.59	2.50	3.44	3.84	15.16
CS^{o}	5.34	6.17	2.87	4.43	5.94	24.75
CS^{-}	4.91	6.44	3.28	4.56	5.75	24.94

Note. Lower scores indicate more negative affect.

levels of sex and four levels of order as between-subject factors, and three levels of targets as the within-block factor. The only effect to attain significance from the analysis was the main effect of target, F (2, 48) = 23.53, $p < .01$. These means are presented in Table 6.

As expected, the greatest mean aggression ratio obtained was to CS^+ (M = .683) and the least to CS^- (M = .544). To test for excitatory and inhibitory effects, each of these means was then compared with the mean to CS^o (M = .565). Results (Dunnett's test) revealed that only the difference between CS^+ and CS^o was significant, d' (3, 62) = .05, $p < .05$, thus indicating the presence of excitatory, but not of inhibitory effects. Also consistent with the lack of inhibitory effect was the fact that the mean aggression ratio to CS^- was not less than .5, as would be expected if the rate of aggression to a target decreased during Phase III relative to the mean base rate.

The results from the aggression as well as the affect measure of this study therefore only supported the prediction of excitatory conditioning. As in Experiment 1, subjects not only increased their level of aggression to CS^+ relative to CS^o following the conditioning phase of the experiment, but also reported more negative affect towards CS^+. On the other hand, the failure to obtain evidence for inhibitory conditioning to CS^- on either the aggression or affect measure

Table 6

Mean Aggression Results in Experiment III

	Measures of Aggression	
Target	B	B / (A + B)
CS^+	9.344	.683
CS^o	6.313	.565
CS^-	5.469	.544

Mean A = 5.550

Note. A = mean response rate prior to conditioning.
B = response rate following conditioning.

would seem to indicate that the conditioned inhibition procedures were not effective. This contrasts with the results of Experiment 1 and 2 that demonstrated differential inhibition effects on the aggression measure (but not on affect) and therefore suggests that the differential inhibition principle applies to the hypothesized target conditioning but that the principle of conditioned inhibition does not. However, predictions based on the conditioned inhibition principle were again assessed in Experiment 4 so that this suggestion will be further considered in light of the results of that experiment.

The failure to support the predictions from the principles of induction in the present study is consistent with the data from the first experiment. As previously noted, this may be due to the unsubstantiated induction principles themselves and need not bring the central assumptions of target conditioning of this thesis into question. However, the lack of support for induction in the present experiment may also simply have been due to the fact that no inhibitory properties were conditioned to the CS^- target in the present study. The predicted induction phenomena were based on contrast effects between CS^+ and CS^- targets so that these should not be expected in the present case because of the lack of CS^- effects.

EXPERIMENT IV

As in Experiment 3, the fourth experiment was an attempt to establish a target as a CS^+ and another as a CS^- from procedures based on the Pavlovian principles of excitation and conditioned inhibition. In the present study, however, the effects of these procedures on aggression were assessed by the same summation technique as that which was used in Experiment 2.

Method

Subjects

The subjects were 16 male, and 16 female students from introductory psychology who participated in the experiment as part of their course requirement. The subjects participated in same-sex groups of four, and one group of males and of females was randomly assigned to each of the four order of target combination conditions.

Apparatus

The apparatus was identical to those used in the previous experiments, with the exception that the paper tapes used for programming the stimuli were unique to the present study.

Procedure

The instructions to subjects, the base rate procedures of Phase I, and the final postexperimental questionnaire

were the same as those of the previous experiments. The classical conditioning procedures (i.e., excitation and conditioned inhibition) of Phase II were identical to those of Experiment 3, while the testing procedures of Phase III were the same as the summation method used in Experiment 2.

Results and Discussion

Postexperimental Questionnaire

The subjects' ratings of the auditory stimuli again indicated that they were perceived as somewhat bothersome in that the mean rating to the tone was 2.28 and that to the white noise was 3.22. As in the previous studies, the sum of subjects ratings on the different affect items to the three target persons were analyzed according to the split-plot factorial design consisting of two levels of sex and four levels of orders as between-subject factors, and three levels of targets as the within-block factor. The only effect to attain significance in this analysis was the main effect of targets, $\underline{F}$ (2, 48) = 34.88, $\underline{p} < .01$. As shown in Table 7, the subjects' overall ratings of affect were the most negative to the CS^{+} person ($\underline{M}$ = 16.38) and the least to CS^{-} ($\underline{M}$ = 24.31). Comparisons (Dunnett's test) of each of these means to CS^{o} ($\underline{M}$ = 24.06), however, revealed that only CS^{+} and CS^{o} were significantly different, $\underline{d}'$ (3, 62) = 1.92, $\underline{p} < .05$. As in the previous experiments, therefore, this indicates that only excitatory effects existed on the affect measure.

Table 7

Mean Affect Ratings in Experiment IV

	Measure of Affect					
Target	Relaxation	Anger	Guilt	Happiness	Upset	Summed
CS^{+}	3.00	3.50	2.22	3.38	4.28	16.38
CS^{o}	5.25	5.88	3.34	4.56	5.03	24.06
CS^{-}	4.88	6.06	3.78	4.56	5.03	24.31

Note. Lower scores indicate more negative affect.

Aggression Ratios

The aggression ratios to the four target combinations were analyzed according to a split-plot factorial design, consisting of two levels of sex and four levels of order as between-subject factors, and four levels of target combination as the within-block factor. Results from this analysis of variance revealed significant main effects for target combinations, $F\ (3, 72) = 11.35$, $p < .01$, and for order, $F\ (3, 24) = 3.06$, $p < .05$. No other significant effects were found.

The significant target combination main effect was examined by multiple comparison tests (Newman-Keuls) between the target combination means. As shown in Table 8, the pattern among these means was not entirely as predicted in that the target combination $CS^{+} + CS^{-}$, rather than $CS^{-} + CS^{o}$ was found to have the smallest aggression ratio. However, the results from the Newman-Keuls multiple comparison tests revealed that the difference between these two target combination means was not significant, $p < .05$. The results indicated that the mean aggression ratio to CS^{+} was significantly greater ($p < .05$) than the means to the combinations $CS^{-} + CS^{o}$ and to $CS^{+} + CS^{-}$, and that the only other significant difference among means was between the target combinations $CS^{+} + CS^{o}$ and $CS^{+} + CS^{-}$.

Table 8

Mean Aggression Results in Experiment IV

Target Combination	Measure of Aggression: B	Measure of Aggression: B / (A + B)
CS^+	8.938	.678
$CS^+ + CS^-$	5.156	.498
$CS^+ + CS^o$	6.219	.577
$CS^- + CS^o$	5.594	.550

Mean A = 6.042

<u>Note</u>. A = mean response rate prior to conditioning.
B = response rate following conditioning.

This pattern of results may be interpreted as evidence for the existence of inhibitory tendencies to CS^-, but are equivocal with respect to whether CS^+ had acquired excitatory properties.

The mean aggression ratio to $CS^+ + CS^-$ was significantly less than to $CS^+ + CS^o$ although the only difference between these two target combinations was whether CS^o or CS^- would also be harmed along with CS^+. Therefore the concurrent harming of CS^- inhibited the aggression to CS^+ more than the concurrent harming of CS^o. A similar inhibitory effect was also indicated in that the simultaneous presentation of the target combination $CS^+ + CS^-$ resulted in a significant reduction in the aggression ratio from that to CS^+ alone, while the combination $CS^+ + CS^o$ did not. Thus the subjects' tendencies to aggress to CS^- and to CS^o differed as were predicted from inhibitory conditioning.

On the other hand, the lack of significant differences between the target combinations $CS^+ + CS^-$ and $CS^- + CS^o$ indicates a failure to support the excitatory conditioning prediction. The only difference between these two target combinations was whether CS^+ or CS^o would also be harmed along with CS^- and it was expected that more aggression

would be expressed to the first combination. The fact that the mean aggression ratio to $CS^+ + CS^-$ was actually less than to $CS^- + CS^o$ (although not statistically so) is difficult to interpret. The mean aggression ratio to CS^+ alone was .678, which seems in itself to show excitatory effects since this value indicates that subjects were more than twice as aggressive to CS^+ during Phase III as they had been in their mean rate of aggression during Phase I. However, this may have occurred solely on the basis of generalized arousal effects and can therefore not be taken as direct evidence for excitatory conditioning effects to CS^+.

The significant order main effect was also examined by multiple comparison tests (Newman-Keuls) between the means of the four order of target combination conditions. The mean aggression ratios for order 1 through 4 were .469, .695, .519, and .620, respectively. Results indicated that the only statistically significant comparison was between order 1 and order 2, $p < .05$. Since the four order conditions simply represented a counterbalanced design of the sequence in which the four target combinations were presented, the difference between these two order conditions may be attributed to chance variation.

Considered together, the results of Experiments 3 and 4 therefore only provided partial support for the predicted excitatory and inhibitory target conditioning effects. The conditioning procedures in each experiment were both based on the principles of excitation and conditioned inhibition, and only differed in the testing method used. Nevertheless, while Experiment 3 only provided evidence for excitatory effects on the aggression measure, the opposite occurred in Experiment 4 where only inhibitory effects were obtained. However, excitatory effects were found on the affect measure in both studies. The fact that the same conditioning procedures were used in each study therefore seems to suggest that the partial support for target conditioning on the aggression measure in each study was a function of differences in the testing methods. However, these testing methods were successful in demonstrating the excitation and differential inhibition effects in Experiments 1 and 2 so that the testing methods, in themselves, do not appear to account for the different pattern of results. It is therefore equally possible that the partial support in Experiments 3 and 4 were due to unreliable conditioning effects associated with the particular conditioning procedures of these latter two studies. The conditioning procedures of Experiments 3 and 4

were more complex than those of Experiments 1 and 2, since two <u>OTHERS</u> lights (representing CS^+ and CS^-) were simultaneously illuminated during the CS^- conditioning phase in Experiments 3 and 4 whereas only one (CS^-) was on in Experiments 1 and 2. Therefore, the equivocal findings of Experiments 3 and 4 could have been due to confusion on the part of some subjects with respect to the meaning of these procedures. This possibility should be examined in future research where alternate operationalization procedures could be employed to minimize confusion. Consequently, conclusions on the question of whether the Pavlovian principles of excitation and conditioned inhibition can be applied to aggression should remain tentative at this time.

GENERAL DISCUSSION

The results of the present studies provided support for the proposed target conditioning model in that evidence was found for both excitatory and inhibitory classical conditioning of targets. Stronger support, however, was obtained for excitatory than for inhibitory target conditioning. Although each of the predictions for both forms of conditioning were obtained on the aggression measure in three of the four studies, the predicted effects on the participants' affect ratings were only found for the CS^+ target. Consequently, although evidence on the aggression measure was found for inhibitory target conditioning based on the procedures from both differential and conditioned inhibition principles, the overall support for this form of target conditioning was limited because of the failure to obtain reliable evidence of conditioned positive affect to CS^-.

It is difficult, however, to explain the present inhibitory results on aggression without assuming conditioned positive affect to CS^-. Alternative explanations for these results are not readily available because the inhibitory phenomena of the present research have not been previously considered in the aggression literature. However, it could be argued, for example, that the present inhibitory results on aggression were simply due to direct response matching or modelling. Such a framework can account for differences in aggression without invoking

corresponding differences in affect. According to Bandura (1973), a person's reaction to another individual in an ambiguous situation such as in a research setting may in part be a function of response matching in that the other's behavior may set standards for responses in that situation. The participants in the present studies, however, were exposed to two different models (CS^+ and CS^-) who exhibited different behaviors. While the behavior of either CS^+ or CS^- could logically have conveyed what levels of responding were perceived as appropriate by the participants in the setting, this explanation does not clearly specify differential modeling effects within the same participants in the studies reported here. Moreover, an explanation based solely on modeling is also limited because despite their not having received any antecedent harm from either CS^- or CS^o, the participants displayed less aggression to CS^- than to CS^o. Direct response matching does not directly apply in Experiments 2 and 4 because the aggressive responses of participants were simultaneously directed at more than one model (target). In addition, the possibility of specific response matching was also minimized in the present studies because exposure and response modality differed. The participants were exposed to long duration tones but were permitted to respond by varying the frequency of brief white noise stimuli.

The norm of reciprocity (Gouldner, 1960; Nacci, Stapleton, & Tedeschi, 1973) may also be considered as another possible interpretation for the present results. According to this perspective, the facilitative effects of attack on aggression need not be attributed to anger, but rather, may simply occur because of a societal norm of retaliation

("an eye for an eye"). This norm could then account for increases in aggression to CS^+ without having to assume that CS^+ was eliciting negative affect. On the other hand, such a perspective also proposes the existence of a positive norm of reciprocity which states not only that one should help those who have helped us, but also that one should not harm those who have helped us (Nacci et al., 1973). The positive norm of reciprocity can then be used to account for decreases in aggression to CS^- by assuming that not being harmed by CS^- was equivalent to having been helped. Accordingly, decreases in aggression to CS^- in the present research may be explained by nromative factors without having to assume that the CS^- person was eliciting positive affect. It should be noted, however, that while the normative interpretation leads to similar predictions as those of Experiment 1, it is doubtful whether the aggression predictions of the other studies of this thesis would have been generated by the normative perspective. Furthermore, several novel predictions about aggression (e.g., blocking) are advanced from the target conditioning model in the following section of this thesis (Research Implications). It is doubtful whether the novel predictions would have been suggested by considering the normative approach. Therefore, support for these predictions by future research may strengthen confidence in the target conditioning model rather than alternative ones.

The failure to obtain evidence for conditioned positive affect to CS^- in the present studies may simply have been due to limitations in the rating scales that were used. The rating scales comprising the summed affect measure may not have been effective for measuring

positive affect. For example, the major source of affect to CS^+ was assumed to be anger. Hence, directly opposite emotions were assumed to have been established to CS^- (cf., Solomon & Corbit, 1974). However, the rating scale tapping this affect only varied from "very angry" to "not angry at all." In retrospect, it seems that this scale may not have been very effective for measuring differences between CS^- and CS^o because "not angry at all" may reflect neutral feelings and not the opposite of "very angry." Participants may have rated themselves as "not angry at all" to both CS^- and CS^o even though their feelings to CS^- may have been directly opposite from that of anger. A similar "ceiling effect" may also have occurred on the upset ("very upset" to "not upset at all") and relaxation rating scales ("not relaxed at all" to "very relaxed").

These issues obviously require further research before any firm conclusions can be made about inhibitory target conditioning. Additional rating scales may be required in future research to demonstrate conditioned positive affect to a CS^- person. Perhaps liking ratings should be used since this scale may better represent positive affect. Furthermore, it is possible that the predicted affective differences between targets may be better measured if research participants were asked to <u>compare</u> their affect for each target person rather than simply indicate their ratings for each. Affective differences between targets may also be better measured if the rating scales were anchored at their midpoints with a neutral category and not just at their endpoints. It should be noted, however, that postexperimental rating scales may not be able to

provide valid measures of how affect may have mediated the present aggression results. These rating scales were only taken after the test for aggression, and therefore, they do not necessarily reflect how participants felt while they aggressed. For example, the participants' feelings to each target could have changed because of the pattern of aggression expressed to these targets (cf., Nisbett & Wilson, 1977). The present affect data, therefore, are equivocal with respect to the proposed mediational role of affect in the target conditioning model. Consequently, to avoid this problem it is suggested that physiological measures also be used to assess affective differences between targets in future research.

Research Implications

Although more research is needed to specify the affective basis of inhibitory target conditioning, the overall findings of the present studies have a number of implications for future aggression research. Various empirical principles have been established for inhibitory conditioning (e.g., Boakes & Halliday, 1972; Rescorla, 1967, 1969) in addition to those considered in the present research, and these may be expected to apply also to aggression. For example, the "retardation of the development of CRs" measurement technique was recommended (along with that of "summation" similar to that used in Experiments 2 and 4) by Rescorla (1969) for effectively demonstrating inhibitory conditioning. This method is based upon the assumption that since the effects elicited by a CS^{+} and CS^{-} should negatively summate, then it should be more difficult to condition subsequent excitatory

tendencies to a CS^- than to a previously neutral CS^o. Thus, in applying this method to aggression, it may be expected that the facilitative effects of aversive stimuli (US) on anger and aggression would be less if received from a person (CS^-) who previously had been negatively associated with similar harm than if received from a previously neutral person (CS^o).

Future research should also investigate the degree to which other classical conditioning principles can be applied to aggression. For example, consideration of the Pavlovian principle of stimulus (CS) generalization leads to predictions about target displacement as was done by Miller (1948). These predictions, however, have been difficult to assess in past research because of the problems associated with the a priori specification and quantification of the many possible factors (e.g., target similarity) affecting stimulus generalization (Feshbach, 1970, p. 231). In addition, the majority of studies on target displacement have provided equivocal findings because of their failure to control for confounding factors (Bandura, 1973, pp. 34-36; Fitz, 1976).

Because there are problems associated with assessing predictions based on stimulus generalization, future research may be better directed if the implications of other Pavlovian principles are examined. For example, according to the principle of extinction, the CR should gradually diminish if

a previously established CS^+ is then repeatedly presented in the absence of the US. Applying this principle to target conditioning implies that a person (CS^+) who had previously delivered harm should elicit less negative affect (and hence should have less aggression expressed against him) if he then discontinued administering harm. Similarly, according to the related Pavlovian principle of extinctive inhibition, continued extinction procedures should not simply reduce excitatory tendencies, but also should serve to build up inhibitory tendencies, (i.e., "extinction below zero"). This therefore implies that an attacker (CS^+) who stops his attacks and continues to do so should not simply become neutral but should become a CS^-. In addition, according to the Pavlovian principle of disinhibition, a distracting or novel stimulus should temporarily disrupt the inhibition tendencies of a CS^-. This would imply that a previous attacker (CS^+) who had undergone continued extinction would come to elicit negative affect temporarily (and hence increased aggression) if a sudden novel stimulus were presented to participants.

For example, these phenomena could be studied in a research paradigm in which B is established as a CS^+ by his repeated delivery of schocks (US) to A. If B then stopped giving shocks, B should first extinguish and then become a CS^- because of extinctive inhibition. The introduction of a sudden novel stimulus such as an unexpected noise should then temporarily

disrupt the inhibitory tendencies and result in a brief increase in aggression toward B (disinhibition).[5]

Additional research implications could be derived by considering other conditioning phenomena. For example, the effects of reinforcement schedules such as partial reinforcement effects (cf., Gormezano & Moore, 1970, pp. 163-168) on acquisition and/or extinction could be studied by having research participants receive aversive US on each trial from one person and on only half the trials from another. Similarly, the various effects (e.g., blocking, overshadowing) associated with compound CSs (cf., Gormezano & Moore, 1970, pp. 160-163) could be examined by having participants harmed by two people. Thus, the degree to which such derivations can be supported in aggression research would serve not only to demonstrate novel aggressive phenomena in many cases, but to provide evidence on the potential and limitations of the proposed target conditioning model.

The target conditioning model also has implications for research on the classical conditioning of aggression in animals. These experiments (Creer et al., 1966; Farris, Fullmer, & Ulrich, 1970; Farris, Gideon, & Ulrich, 1970; Lewin & Lewis, 1976; Lyon & Ozolins, 1970; Vernon & Ulrich, 1966) have generally been implemented with pairs of rats in small cages where a series of shocks (US) were first presented unpaired with a light/tone CS^+ prior to conditioning. The

rationale for first presenting the US unpaired with the CS^+ has been to control for sensitization and pseudoconditioning effects. The target conditioning model, however, implies that the target animal in these studies may have been established as a CS^+ for aggression during these preliminary procedures. This may have occurred because these rats who were generally reared in isolation, obtained their only experience with another rat when they were repeatedly shocked during the experiments. Consistent with this interpretation, Azrin (1967) and Ulrich (1967) have anecdotally reported that the mere sight of another rat elicited fighting responses among rats who had been previously used as subjects in pain-aggression experiments. Similar findings were also reported in the first study on pain-aggression conducted by O'Kelly and Steckle (1939). The persistence of aggression among experimental animals could have been due to sensitization or pseudoconditioning effects. The possibility that it may have resulted from target conditioning, however, indicates a need for appropriately controlled research on the issue in view of some of the implications it poses for this research.

In particular, the possibility that the target animal in this research may have been established as a CS^+ suggests that attempts to later condition a light/tone CS^+ in the presence of the animal CS^+ would be relatively ineffective. This failure to condition to the light/tone CS^+ may be due to

"blocking." The blocking phenomenon (Kamin, 1968, 1969) involves conditioning to a compound CS^+, i.e., AX, where prior conditioning to the A component prevents conditioning to X when subsequent conditioning to the AX compound is attempted. If conditioning to the target animal (A) is assumed to have occurred prior to the shock pairings to the (X) tone/light (i.e., A was still present, making it a compound CS^+, AX), then conditioning to the tone/light CS^+ should have been blocked.

The occurrence of blocking may in part account for the difficulties in conditioning aggression to tones or lights CS^+ in past studies. As has been noted by Myer (1971, pp. 502-503) and Johnson (1972, pp. 39-40), the success of these conditioning experiments is questionable since the frequency of fighting responses (CR) to the CS^+ in most of these studies was quite low, despite hundreds and even thousands of CS-US pairings (e.g., Vernon & Ulrich, 1966). While Myer (1971) has discussed several factors that may have contributed to these equivocal results (e.g., species-specific difficulty of conditioning to auditory CS), the possibility of target conditioning and its consequence of blocking should be explored in future research.

Theoretical Implications

The results from the present research program indicated that the often demonstrated effects of provocation can be considered in terms of excitatory target conditioning. As

previously noted, this interpretation was not directly supported by the previous research in the area because of some of the methodological limitations imposed by traditional research paradigms. One problem is that the only target usually available to provoked research participants was the person who had administered the antecedent aversive stimuli.[6] Hence the usual comparison of the provoked participants' aggression to that of those in a control group who had not been provoked does not necessarily demonstrate that the provoked participants were more aggressive to their provoker than to other targets should they also have been available. As previously noted, these results could have been in part due to generalized arousal (Bandura, 1973) which could have increased aggression against all available targets. The present results, however, demonstrated that antecedent aversive stimuli produce target-specific effects.

In addition, the present results may imply that excitatory and inhibitory effects have been confounded in previous research because the target in the "control" conditions may frequently have functioned as a CS^-. The present results (especially those of Experiments 1 and 2) demonstrated that aggression to a target is inhibited if this target (CS^-) had been explicitly associated with the absence of antecedent aversive stimuli. Similar phenomena may have occurred in the control conditions of previous research in which research participants were often

informed that the confederate-target could deliver aversive stimuli, but none was given (or the minimum allowable was delivered). Differences in aggression between the control and experimental conditions in such studies may therefore have been due to both excitatory and inhibitory effects. Consequently, the findings from such research should not be interpreted as due solely to excitation (e.g., anger).

There are a number of other theoretical implications suggested by considering the effects of antecedent aversive stimuli on aggression in terms of classical conditioning. First, the target conditioning model provides a theoretically explicit basis for predicting various victim-specific effects. The present results clearly indicated that there are limitations with theoretical propositions that relate antecedent aversive events to aggression but that do not link the process to a particular target(s). For example, the frequent claim in the literature that aversive events "instigate" aggression, or elicit anger that facilitates aggression suggests that aversive events increase aggression indiscriminantly. Moreover, this assertion is not explicit in specifying that the effects of aversive stimuli will be specific to the person associated with the aversive stimuli. However, while victim-specific effects have been implied by most theorists, the actual basis for such effects of provocative stimuli has rarely been theoretically specified (cf., Tannenbaum and Zillmann, 1975, pp. 175-176).

In fact, the present findings indicated that antecedent aversive stimuli may actually inhibit aggression against a target (CS^-) if that person had been negatively correlated with these stimuli. Consequently, the target conditioning model offers a parsimonious basis for explaining these different effects of antecedent aversive stimuli on behavior.

Secondly, consideration of the classical conditioning paradigm to account for the effects of antecedent aversive stimuli seems to overcome one of the limitations that presumably restricts the utility of learning models. Specifically, it has been argued that learning models are mainly restricted to determining the form of the aggressive responses, but that the role of learning is minimal with respect to the impetus or motivation for aggression created by aversive stimuli (e.g., Feshbach, 1970, p. 173). In fact, the victim-specific results of the present studies suggest that it is the learned components of motivation (CRs) rather than the unlearned motivation (UR) created by antecedent aversive stimuli that critically affects aggression.

Another consequence of the target conditioning model is that it provides a clear basis for rejecting the so-called hydraulic models of aggression in favor of a learning perspective. One of the critical elements of hydraulic models common to psychoanalytic (Chodorkoff & Baxter, 1969; Heimann & Valenstein, 1972) as well as frustration-aggression

theories of aggression (Dollard et al., 1939) is that aggressive motivation endures until it is discharged by aggression. There is, however, clearly no need to assume that provocative stimuli produce enduring effects on behavior if it is assumed that the provocator becomes a CS^+. Rather it is assumed that the direct emotional effects (UR) elicited by antecedent aversive events (US) dissipate and that the conditioned emotional responses (CRs) are elicited by the provocator (CS^+) at a later point in time. For example, it is not necessary to assume that a person would be continuously angry if he had been harmed by someone on a previous day. Anger can be expected to be elicited, however, if he then met the provoker (CS^+). An analogous example from fear conditioning can be provided. Receiving a bite (US) from a dog should establish that dog as a CS^+ for fear (CR), but one should not continue to experience fear unless the dog were present.

It should be noted that this analysis for the reactivation of anger is similar to a process proposed within Bandura's social learning theory of aggression (Bandura, 1973, p. 57; also, see Konečni, 1975). The reactivation of anger on later occasions following provocation was proposed by Bandura as due to self-arousal, whereby anger was assumed to be capable of being regenerated by thinking about past aversive incidents. Presumably, if thinking about past aversive experiences from

a provoker can elicit anger, then so should the actual sight of the provoker. The self-arousal assumption, however, is based on a symbolic rather than a direct classical conditioning phenomenon (cf., Bandura, 1969, pp. 579-584). According to Bandura, people "become easily angered by the sight or thought of individuals with whom they have had hostile encounters" (Bandura, 1973, p. 45). Although direct and symbolic classical conditioning were explicitly stated as the bases for these effects in this instance, much of his discussion on self-arousal fails to identify specifically the role of target conditioning.

Since classical conditioning received relatively little attention by Bandura (1973), incorporating the present target conditioning model within that framework may increase the scope of the social learning analysis of aggression. There are, however, two issues in particular that should be considered if this consolidation is to occur. First, although Bandura has emphasized the importance of response consequences as a major determinant of aggression, this stress on the instrumentality of aggression should not be viewed as conflicting with the target conditioning model. Berkowitz (1973) has maintained that aggression that is under the influence of classical conditioning is involuntary, reflexive, or "impulsive," and therefore not a functioned of response consequences. Classically conditioned responses are frequently assumed to

have such characteristics, whereas instrumental responses are generally assumed to be a function of response consequences (Rescorla & Solomon, 1967, p. 157; Seward, 1970). The application of classical conditioning in the study of aggression, however, should only imply involuntary or reflexive aggressive responses if aggression itself could be assumed as the CR. This assumption does not appear to be possible either in the case of Berkowitz' model or with respect to the present target conditioning model. There are no unlearned aggressive responses in humans (Johnson, 1972, p. 137) so that aggression should not be considered as the UR or consequently as the CR in these models. It is assumed in the target conditioning model that a CS^+ target elicits negative emotional CRs. While these CRs may be viewed as involuntary responses, the aggressive responses themselves may be assumed to be instrumental as is proposed by Bandura.

This issue can be illustrated by considering the interrelationship between classical conditioning and instrumental learning in the escape-avoidance paradigm (Seward, 1970, p. 57). Although classically conditioned fear to a CS^+ previously paired with shock US can motivate avoidance behavior, the avoidance responses themselves are still conceptualized as instrumental in nature and are considered to be acquired and maintained by their consequences. Thus, a CS^+ for fear can be expected only to facilitate avoidance response if these responses have been previously acquired and

if they lead to reinforcing consequences. Classically conditioned anger to a CS^+ person can be conceptualized in an analogous manner. It can be assumed that this conditioned anger (CR) should only facilitate aggression if a person has learned to behave aggressively and if aggressive responses have functional value (cf., Bandura, 1973, p. 174). In both cases the fact that overt instrumental responses can be motivated by emotional CRs need not imply that the overt behavior is not a function of its consequences. Therefore Berkowitz' emphasis on the automatic nature of aggression because of classical conditioning is not implied in the present target conditioning model.

The role of cognitive factors within the target conditioning model is the second issue that needs to be considered if this model is to be incorporated within a social learning analysis of aggression. In particular, classical conditioning is assumed to be cognitively mediated within Bandura's social learning theory (Bandura, 1969, pp. 579-584; 1971, pp. 14-16; 1974, p. 859). A similar assumption, therefore, may be advanced for the present target conditioning model. According to Bandura, conditioning does not occur simply because of the pairings of CS and US, but rather depends to a large extent on the development of awareness that the CS and US are correlated. However, the type of conditioning situations considered by Bandura in developing this cognitive

mediation interpretation of classical conditioning has been generally restricted to cases where the CS were sensory stimuli such as tones or lights. On the other hand, the CS according to the target conditioning model is another person and this may represent an important difference in terms of the kind of cognitive processes that should be assumed to underlie the classical conditioning of targets.

As in social learning theory, simple temporal pairings of another person (CS) and aversive stimuli (US) should not be considered to produce conditioning automatically but may be assumed to depend largely upon cognitive mediation (cf., Bolles, 1972; Ross & Ross, 1976). It can be argued, however, that while it may be useful to assume that CS-US pairings depend upon awareness of their correlation for conditioning to occur with sensory CS, more complex mediational processes underlie conditioning when the CS is another person. For example, several experiments (e.g., Burnstein & Worchel, 1962; Cohen, 1955; Epstein & Taylor, 1967; Greenwell & Dengerink, 1973; Nickel, 1974; Pastore, 1952) have demonstrated that the effects on aggression of antecedent harm from another person vary according to such factors as whether the antecedent harm was perceived as arbitrary, intentional, forseeable, or unjustified. These factors are implicated as theoretically important in terms of attribution processes (e.g., Heider, 1958; Jones & Davis, 1965; Kelley, 1971;

pp. 14-15; Kruglanski, 1975, pp. 398-399; Maselli & Altrocchi, 1969; Rule, 1974; Sherer, Abeles, & Fisher, 1975, chap. 4). Therefore, attribution processes may be involved in the mediation of target conditioning.

The suggestion that attributions be considered as mediating processes for classical conditioning when the CS is another person obviously requires further theoretical attention. Such a conceptualization could provide a basis for a rapprochement between attribution and learning perspectives of aggression (Leger & Rule, Note 1, Note 2). In addition, further empirical and theoretical attention should also be given to the role of attribution processes within the different aggressive phenomena that have been derived from the various classical conditioning principles in this thesis. Therefore, since many of these (e.g., inhibition, extinction, blocking) represent novel aggressive phenomena, such focus could considerably expand the range of both attribution and social learning analyses of aggression.

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FOOTNOTES

1. The only explicit consideration of classical conditioning in the study of human aggression has been accomplished by Berkowitz (1971, 1973, 1974). Berkowitz' application of classical conditioning, however, has been different from the analysis proposed here in that he has mainly focussed on the effects of associating a target with "aggressive cues" such as weapons (Berkowitz & LePage, 1967), aggressive words (Berkowitz, 1973), and violent movies (Berkowitz, 1965; Berkowitz & Geen, 1966, 1967; Geen & Berkowitz, 1966). Berkowitz (Berkowitz, 1974; Swart & Berkowitz, 1976) has further explicated the role of conditioning in aggression by examining the effects of stimuli associated with reinforcement. This conceptualization also differs from the present model in that the US being assumed in this thesis are antecedent aversive stimuli, and not reinforcers, weapons, aggressive words, or violent pictures.

The only other explicit application of classical conditioning has been within the pain-aggression formulation of animal aggression developed by Azrin and Ulrich (Azrin, 1967; Hutchinson, 1972; Ulrich, 1966, 1967; Ulrich & Azrin, 1962; Ulrich, Hutchinson, & Azrin, 1965; Ulrich et al., 1973). These theorists assume that antecedent aversive stimuli are US and that aggression in animals is an unconditioned response (UR). Several studies conducted within this formulation have demonstrated the classical conditioning of animal aggression to a tone or light CS that had been paired with aversive US (Creer, Hitzing, & Schaeffer, 1966; Farris, Fullmer, & Ulrich, 1970;

Farris, Gideon, & Ulrich, 1970; Lewin & Lewis, 1976; Lyon & Ozolins, 1970; Vernon & Ulrich, 1966). However, this application of classical conditioning differs from the analysis presented in this thesis: Although they are similar in that they both consider antecedent aversive stimuli as US, they differ in that the consideration of CS in the animal literature has been limited to sensory stimuli such as tones or lights. On the other hand, the CS according to this thesis is another person -- the provoker.

2. It should be noted that conditioned fear could be a more appropriate description of the CR under certain circumstances such as when the CS person had been associated with very intense aversive US. However, although the effects of fear and anger may be fuctionally similar (Bandura, 1973, pp. 54-55), the prediction of their differential behavioral effects would need to consider several additional factors (e.g. see Berkowitz, 1962, pp. 42ff.; Buss, 1961, pp. 29ff.) and will not be considered in the present analysis. For purposes of the present research, therefore, the aversive US will be limited to those which can be assumed to produce anger as the major component of the CR.

3. In some studies (e.g., Baron & Eggleston, 1972; Berkowitz & Knurek, 1969; Fitz, 1976), the confederate in the control conditions had also been associated with positive events prior to the test for aggression (e.g., the confederate gives a positive rather than a negative evaluation of the subjects' performance). Therefore, to

the extent that these positive antecedent events were functionally equivalent to US for positive affect, the confederate in these control conditions should also not have been a neutral stimulus at the time of the test for aggression because of the Pavlovian principle of counterconditioning. Thus while the tendencies (positive affect) which may be assumed to have been elicited by this confederate can also be assumed to inhibit aggression, this would not be because of inhibitory conditioning because the subjects' experience was not with the same US which is assumed to form the basis for the conditioning of CS^+ and CS^- targets.

4. The error term and df for these comparisons were those obtained from the analysis of variance on the target factor only, with the data collapsed across sex and order conditions because of their lack of significance. This procedure was again utilized in all subsequent tests of differences among means whenever the sex and order effects were nonsignificant.

5. It should be noted that Pavlovian disinhibition could also be examined in a situation where a CS^- target had been established through differential or conditioned inhibition principles similar to those used in the present studies.

6. The need to provide angered subjects with other targets in addition to the provoker has also been discussed by Tannenbaum and Zillmann (1975, pp.175-176) and Fitz (1976). As was noted by Tannenbaum and Zillmann, however, the evidence for provoker-specific effects of provocation is conflicting and difficult to reconcile because of the procedural differences among the few studies that have examined this question.

APPENDIX A

Instructions to Subjects

The experimenter read the following to the four subjects upon their arrival:

> The experiment is concerned with physiological reactions to different kinds of auditory stimuli (i.e., sounds). It's basically an easy experiment -- there's nothing to learn, etc. Essentially, all you have to do is wear headphones, and listen to different kinds of sounds, and I'll be measuring either your GSRs or your blood pressure depending upon your particular condition.
>
> However, the sounds that we'll be using are quite loud, i.e., loud white noise or loud high pitch tones. These may make you jump a little, but they won't harm you, so don't worry, OK.
>
> Now, this is why we need 4 subjects at a time in the experiment. What I'm studying are physiological reactions to loud sounds in a social situation. What I'm trying to find out, is whether or not a person's physiological reactions are similar when he _gives_ a sound stimulus to others, as when he _receives_ a similar stimulus himself. Since you may have to write a report on this experiment for your course, I'll quickly give you the theory behind the experiment. There is a "cognitive mediation hypothesis" in physiology which states that if you imagine a stimulus which normally elicits a physiological reaction when you actually experience it, then simply _thinking_ about it will elicit components of the reaction. For example, experiments were done where subjects were told not to move their arms, and to simply think about climbing a rope. Muscle potentials taken off the arms revealed a pattern of "left -- right," etc.
>
> Now, the problem with that kind of experiment is that the subjects could have been "faking" the results by voluntarily moving their arms. With aversive sounds, in the present experiment, this is not possible. Therefore, we think that if a person has to give a negative, aversive sound to others, we think that he would _imagine_ the reactions of the receiver, and would therefore respond physiologically in the same way himself. Of course, the reactions of the giver may not be as strong as those of the receiver, but they might be of the same kind.
>
> Here is an example that may help you to better understand what I'm getting at. If I connected you (POINT TO ONE PERSON) to a GSR, and took a syringe (i.e., needle), and stuck it in your arm -- I would get

a GSR reaction, right. Now, according to the theory, if I then simply asked you to imagine the needle going into your arm, then according to the theory, I should get the same pattern of GSRs, although not as strong. However, if you simply closed your eyes, but didn't really think about the needle, you wouldn't react very much, right. OK, now to guarantee that you're really thinking about it, I could give you (SAME PERSON) the needle, and ask you to stick it in his/her (OTHER PERSON) arm. In this way, you (PERSON WITH NEEDLE) would be forced to think about it and therefore you should react physiologically. This is essentially what we're going to do in this experiment, except that we'll be using loud sounds instead of needles. Each of you will not only be receiving one of these sounds, or both depending upon the experimental condition you're in, but you'll be giving one of the two sounds to the others as well. Thus, what we're going to find out is that if you give one of these loud sounds to someone else, do you imagine his/her reactions, and therefore respond physiologically in the same way as the person receiving it, or as when you, yourself, received it.

Essentially, what the experiment will try to do is to correlate each of your physiological reactions, both when you're giving, as well as when you're receiving the aversive stimuli, i.e., loud sounds. The factors which determine your GSR and blood pressure changes to these sounds are:

1) the type of aversive stimuli (loud tones, or white noise);
2) the frequency of the aversive stimuli (how often); and
3) the duration of the aversive stimuli (long, or short duration).

OK now, these factors will be looked at in the experiment. There are 4 conditions to the experiment. I'll explain what you're each suppose to do, depending upon which condition you're in. For example, condition 1 involves blood pressure only, condition 2, both GSR and blood pressure, etc.

Please understand that you are free to refuse to participate, if you don't want to, OK (OBTAIN CONSENT).

What we're going to do is arbitrarily and randomly decide which condition each of you will be in (i.e., this will avoid personality biases which would result if you could choose which condition you were in). Here are four doors, and each one is for a different condition. Choose one room, and then go in, close the door, and read the brief instructions which you'll find on the desk.

I'll then come in and connect the physiological equipment and explain exactly what you're each supposed to do, depending upon your particular condition.

The subjects then each chose one of the four adjoining rooms. The following printed instructions were placed on the desk in each room:

Condition No. 4

You will be wearing headphones during the experiment. Please put them on now, you'll be able to hear some music. Listen to the music until the experimenter arrives, and try to relax as much as you can before the experiment begins. This is important so that your GSR can be determined for "base rate" purposes before the experiment begins.

The experimenter will explain what you are to do. During the experiment, please try to relax as much as you can. It will be important for you to try to keep the hand that has the physiological electrodes as relaxed as possible, and not to move it. Unnecessary hand movements may distort the GSR recordings, so please try to keep the hand relaxed.

Thank you,
Gerry J. Leger,
Experimenter

The experimenter then entered each room in turn, and said the following while connecting the bogus physiological electrodes to the subject's nonpreferred hand:

OK, you're in condition No. 4: I'll only be measuring your GSRs, and not your blood pressure in this condition. I'm going to have you listen to the music for another minute or so, so that I can measure the base rate of your GSRs. Then, I'll come on over the headphones and give you the instructions of what exactly you are to do. Then, I'll be back in to see you to see if you have any questions before we start the experiment. Just listen carefully to the instructions, and please try to keep this arm relaxed at all times.

The following tape-recorded instructions were then simultaneously read to the four subjects over headphones:

> OK, everybody, please listen carefully. Some of you are having your GSRs recorded, others your blood pressure, and some are having both your GSR and blood pressure recorded. In all conditions, it is very important that you try to not move your arm with the physiological electrodes. So just try to keep this arm relaxed during the experiment.
>
> Now, whoever is in condition 1, you're having only your blood pressure recorded; in condition 2, you're having both your GSR and blood pressure taken, and in conditions 3 and 4, you're having only your GSRs recorded. I'll be correlating these measures when you're RECEIVING, as well as when you're GIVING the aversive stimuli.
>
> Now, I'll describe what you all have to do: There are 3 possible types of situations involved. The first possibility is when the GIVE light is ON; the second is when the RECEIVE light is ON -- you'll note that only one of these two lights will be ON at any one time; and the third possibility is when the RECEIVE and GIVE lights are both OFF.
>
> Let me explain what these mean. The first possibility is when your GIVE light is ON; this is the only period when you can press the response button. While the GIVE light is ON, you will see that at least one of the OTHERS lights will also be ON at this time. This means that if you press the response button at this time, that this person -- as indicated by the OTHERS light -- will receive an aversive stimulus. It may occur, but not necessarily, that two of the OTHERS lights are ON at the same time, in which case, both would receive the aversive stimulus if you press the button at this time.
>
> The second possibility is when your RECEIVE light is ON; this is the time when you may receive an aversive stimulus from the others. You'll notice that at least one of the OTHERS lights will also be ON at this time, meaning that this person may give you an aversive stimulus. It may also occur that two of the OTHERS lights are ON at the same time, meaning that both now have the opportunity during this time to give you the aversive stimuli.
>
> The third possibility is if both the RECEIVE and GIVE lights are OFF; then this is your rest period, and just relax, OK. This is the period when the others are interacting, and when you're not involved in either the giving nor in the receiving of stimuli.

Depending upon your particular condition, some of the lights may be ON more than others, but you'll see this as the experiment progresses.

Now, please pay attention. There are two kinds of aversive stimuli involved. Those of you in conditions 1, 2, and 3, you'll be giving the loud tone when you press your button down. The duration will depend upon how long you hold the button down. In condition 4, you'll be giving the white noise, but you will not be able to vary the duration. Each button press from the person in condition 4 will deliver a brief .5 second burst. This means that those of you in conditions 1, 2 and 3 may receive the tone from each other, as well as the white noise from Number 4, while Number 4 will receive only the tone.

The situation is set up so that you all have some freedom concerning whether or not you press the response button when your GIVE light is ON. It's mainly up to you. However, I want all of you to press it at least some of the time, so that I can measure any physiological effects, though you don't have to press it all the time. Therefore, you can press it more to some lights than to others, and you can vary, that way, no one will be able to predict when they will receive the stimuli. However, I have some suggestions which you can keep in mind as a rough guide. What I suggest is that the people in conditions 1, 2 and 3, who are giving the tone, vary the durations a little bit. The person in condition 4, who is giving the brief .5 sec white noise, however, since you can't vary durations, what I suggest is that you vary how often you press it.

OK, so this means that the decision of when to press the button -- and for how long in conditions 1, 2 and 3 -- is all up to you. The reason for this is based on the theory that was already explained to you. I'm trying to find out whether you respond physiologically when you give these loud sounds. We think that you will only do so if you are thinking, or imagining, what you are doing when you're giving, so that's why I leave the decision of when to press it entirely up to you.

Now, I'm going to give all of you a sample of both the white noise and the tone, so that you'll know what stimuli are involved. This will also provide me with an index of your physiological reactions before we start. I'll be in to see you after, to see if you have any questions before we start the experiment. Thank you.

The experimenter then entered each room in turn and answered any questions from subjects by reiterating portions of the previous instructions. After ensuring that each subject understood the task, the experimenter then left the room and activated the equipment to begin the experimental manipulations.

At the end of the behavioral portion of the experiment, soft music was again played over the subjects' headphones. The experimenter then entered each room in turn and said:

> The experiment is now over. Before you go, however, I need to measure your base rate of GSR again, so I'm going to have you listen to some music for a few minutes, and try not to move the hand with the electrodes.
>
> One other thing, while you listen to the music, I'd like to ask you to fill out this brief questionnaire (Postexperimental Questionnaire, see Appendix B). It will only take a few minutes, and the results may help me to interpret your physiological reactions.

The experimenter then left the room and reentered when each subject had finished the Postexperimental questionnaire. The electrodes were then disconnected, and each subject was then individually probed for possible suspiciousness. Each subject was then handed the following printed instructions as part of the debriefing procedures, and told to read it before leaving the room.

> DEBRIEFING
>
> Explanation of Experimental Manipulations
>
> I would now like to explain in full detail what the experiment was about. Each of you was told that the experiment was concerned with physiological reactions to aversive stimuli. What the experiment was really designed to find out was whether or not people would give aversive stimuli to someone who had previously been aversive toward them.

Although your physiological responses were <u>not</u> actually recorded, it was necessary for the experimenter to create the impression that they were, so that a plausible reason would exist for creating a situation where you would give and receive negative stimuli. The experimenter tried to create the impression that the person in condition 1 was attacking you, to find out whether you would increase the number of aversive stimuli which you would then give him (her). <u>The experimenter actually gave you these stimuli</u>, and not one of the other subjects. In fact, each of you was led to believe that you were in condition 4, so that there was nobody, really, in condition 1, 2, and 3. This was necessary so that experimental control could be maintained. Also, your button-press responses during the experiment did not cause aversive stimuli to be delivered to the other persons. The experimenter simply recorded how often you pressed it. Please come out now, and the experiment will be described to you in more detail.

APPENDIX B

Postexperimental Questionnaire

CONDITION NO. 4

Postexperimental Questionnaire

In order to better be able to interpret your physiological reactions, it is necessary to obtain your general impressions and feelings about the experiment. How we react, physiologically, when we receive or give different stimuli may depend, in part, on how we feel at the time, as well as on our perceptions of the other people involved.

Please do not put your name on this questionnaire. I assure you that your responses to this questionnaire will be kept confidential -- even from the other people who participated with you in this experiment. Please be frank, and report your true feelings. Do this by placing a check (✓) at the appropriate point on each scale item.

Thank you,

Gerry J. Leger,

Experimenter

1. AGE: _____

2. SEX: Male _____

   Female _____

3. In your everyday life, do you generally find that loud, sudden noises make you "jump"? If so, briefly describe an example that has occurred to you:

   ____

   ____

   ____

   ____

4. If you had to listen to 1 minute of the loud tone which you heard in this experiment, how bothersome would you find it?

   VERY BOTHERSOME /___/___/___/___/___/___/___/ NOT BOTHERSOME AT ALL

5. If you had to listen to 1 minute of the loud white noise which you heard in this experiment, how bothersome would you find it?

   VERY BOTHERSOME /___/___/___/___/___/___/___/ NOT BOTHERSOME AT ALL

6. Estimate the magnitude of your galvanic skin responses (GSRs) when you <u>received</u> the aversive stimuli during the experiment.

   REACTED VERY MUCH /___/___/___/___/___/___/___/ REACTED VERY LITTLE

7. Estimate the magnitude of your galvanic skin responses when you <u>gave</u> the aversive stimuli during the experiment.

   REACTED VERY MUCH /___/___/___/___/___/___/___/ REACTED VERY LITTLE

8. Since each person in the experiment was randomly assigned to each of the 4 conditions, you have no way of knowing at this point which of the three persons that you met at the start of the experiment were in conditions 1, 2, or 3. However, how you felt, especially when you were giving the loud sounds, is possibly important in interpreting your GSR recordings. Therefore, please complete all of the following items to the best of your ability.

   (a) Rate <u>your</u> feelings with respect to the person in <u>condition 1</u>:

VERY RELAXED	/___/___/___/___/___/___/___/	NOT RELAXED AT ALL
VERY ANGRY	/___/___/___/___/___/___/___/	NOT ANGRY AT ALL
VERY GUILTY	/___/___/___/___/___/___/___/	NOT GUILTY AT ALL
VERY HAPPY	/___/___/___/___/___/___/___/	NOT HAPPY AT ALL
VERY UPSET	/___/___/___/___/___/___/___/	NOT UPSET AT ALL

   (b) Rate <u>your</u> feelings with respect to the person in <u>condition 2</u>:

VERY RELAXED	/___/___/___/___/___/___/___/	NOT RELAXED AT ALL
VERY ANGRY	/___/___/___/___/___/___/___/	NOT ANGRY AT ALL
VERY GUILTY	/___/___/___/___/___/___/___/	NOT GUILTY AT ALL
VERY HAPPY	/___/___/___/___/___/___/___/	NOT HAPPY AT ALL
VERY UPSET	/___/___/___/___/___/___/___/	NOT UPSET AT ALL

   (c) Rate <u>your</u> feelings with respect to the person in <u>condition 3</u>:

VERY RELAXED	/___/___/___/___/___/___/___/	NOT RELAXED AT ALL
VERY ANGRY	/___/___/___/___/___/___/___/	NOT ANGRY AT ALL
VERY GUILTY	/___/___/___/___/___/___/___/	NOT GUILTY AT ALL
VERY HAPPY	/___/___/___/___/___/___/___/	NOT HAPPY AT ALL
VERY UPSET	/___/___/___/___/___/___/___/	NOT UPSET AT ALL

9. Did you feel that you understood the purpose of the experiment? Would you explain it briefly in your own words.

10. Any general comments?

APPENDIX C

Summed Affect Scores

Five scales were included in the postexperimental questionnaire for measuring the subjects' positive or negative affect towards each target. First, subjects were asked to rate how relaxed they felt with each of the three target persons (with 1 indicating "not relaxed at all," and 7 as "very relaxed"); second, subjects were asked to rate their levels of anger to each target (with 1 indicating "very angry," and 7 as "not angry at all"); third, subjects were asked to rate how guilty they had felt when they had harmed each target (with 1 indicating "not guilty at all," and 7 as "very guilty"); fourth, they were asked to rate how happy they were with each target (with 1 indicating "not happy at all," and 7 as "very happy"); and fifth, subjects were asked to rate their degree of upset with each of the three target persons (with 1 indicating "very upset," and 7 as "not upset at all").

In each case lower scores were taken to indicate more negative affect, since it was assumed that negative affect towards a target person would result in ratings of less relaxation, greater anger, less guilt, less happiness, and greater degrees of upset. These scales were then summed to yield a composite affect score toward each of the three target persons. Therefore, this score could vary from 5 to 35, and it was assumed that the lower scores would indicate more overall negative affect.

APPENDIX D

Aggression Ratio Scores

Different dependent measures of aggression were available from the data in the present research program. The rate of aggression (i.e., number of responses per minute) to each target was available before (Phase I) as well as after (Phase III) the classical conditioning procedures. Therefore although it was possible to assess the effects of these procedures by simply analyzing the rate of aggression to each target during Phase III, it was also possible to examine the amount of change in the level of aggression to each target from Phase I to Phase III, since such a measure could reduce the inter-subject variability in the data. One such measure was change scores (B - A), where each subject's mean base rate (A) during Phase I (mean number of responses to the three targets) was subtracted from the response rates (B) to each target during Phase III. However, an examination of measures used to assess the effects of classical conditioning (e.g., Church, 1971, p. 713) suggested that the aggression data in each experiment could also be expressed as an "aggression ratio," B / (A + B), analogous to the commonly used suppression ratio in CER experiments. Applied to the aggression data, this ratio should provide an index of the relative change in the rate of aggression from Phase I to Phase III. The ratio has a minimum value

of .00 and a maximum of 1.00. A value of .50 would indicate no change in the amount of aggression expressed before and after the conditioning phase. If the rate of aggression to a target during Phase III was twice that of the mean base rate, the ratio would be .67, and on the other hand, would have a value of .33 if the rate of aggression to a target during Phase III was only half that of the mean base rate. Since this ratio was found by Church (1969) to be better than other measures with CER data, the similar possibility was explored with the present data.

Two criteria were used to select among the three alternate dependent measures of aggression using the data from Experiment I. First, aggression ratios B / (A + B), change scores (B - A), as well as absolute aggression rates (B) during Phase III were computed for CS^{+}, CS^{-}, and CS^{o}, and examined for their ability to meet the assumption of homogeneity of variance. Results indicated a lack of homogeneity of variance for the measures B, $\underline{F}$ max (3, 31) = 5.65, $\underline{p} < .01$, and for B - A, $\underline{F}$ max (3, 31) = 4.94, $\underline{p} < .01$. The assumption of homogeneity of variance for the measure B / (A + B), on the other hand, was not rejected, $\underline{F}$ max (3, 31) = 1.34,

$\underline{p} \geq .05$. The second criterion used was the sensitivity (w^2) measure utilized by Church (1969) to select the best measure of response suppression. Applied to the different aggression measures, w^2 can be defined as the proportion of the variation in the aggression measure that can be accounted for by variance in the experimental treatment (target condition), and thus provides an estimate of the strength of the relationship between treatment and the proposed measure of aggression. Computations of w^2 (Kirk, 1969, p. 134) for B, B - A, and B / (A + B) yielded values of .047, .059, and .092, respectively, indicating that the highest sensitivity was obtained for the aggression ratio measure. The superiority of B / (A + B) on both criteria with the data from Experiment I, therefore, was used as the basis for its selection as the major dependent measure of aggression in the present research program.

APPENDIX E

Analysis of Variance Summary Tables for the Aggression Ratios and the Summed Affect Ratings

Note: The order of these tables are presented in the same order as they are discussed in the text.

Table 1E

Summary of Analysis of Variance of the

Summed Affect Ratings in Experiment I

Source	df	MS	F	P
Between subjects				
Order (O)	3	47.3993	3.19	< .05
Sex (S)	1	3.7604	.25	
O x S	3	34.3715	2.31	
Error between	24	14.8576		
Within subjects				
Target (T)	2	979.6978	58.88	< .01
O x T	6	21.2531	1.28	
S x T	2	1.1353	.07	
O x S x T	6	37.2685	2.24	
Error within	48	16.6388		

Table 2E

Summary of Analysis of Variance of the

Aggression Ratio Scores in Experiment I

Source	df	MS	F	P
Between subjects				
Order (O)	3	.0193	.3066	
Sex (S)	1	.0512	.8142	
O x S	3	.0523	.8316	
Error between	24	.0629		
Within subjects				
Target (T)	2	.2473	7.4017	< .01
O x T	6	.0523	1.5644	
S x T	2	.0414	1.2398	
O x S x T	6	.0483	1.4455	
Error within	48	.0334		

Table 3E

Summary of Analysis of Variance of the

Summed Affect Ratings in Experiment II

Source	df	MS	F	P
Between subjects				
Order (O)	3	5.3750	.33	
Sex (S)	1	6.0000	.37	
O x S	3	12.2778	.76	
Error between	24	16.0833		
Within subjects				
Target (T)	2	1143.4460	41.99	< .01
O x T	6	15.1148	.56	
S x T	2	11.2824	.41	
O x S x T	6	8.8075	.32	
Error within	48	27.2288		

Table 4E

Summary of Analysis of Variance of the Aggression Ratio Scores in Experiment II

Source	df	MS	F	P
Between subjects				
Order (O)	3	.1037	1.98	
Sex (S)	1	.0379	.72	
O x S	3	.0647	1.23	
Error between	24	.0525		
Within subjects				
Combinations (C)	3	.4372	28.28	< .01
O x C	9	.0277	1.79	
S x C	3	.0048	.31	
O x S x C	9	.0095	.61	
Error within	72	.0155		

Table 5E

Summary of Analysis of Variance of the

Affect Ratings in Experiment III

Source	df	MS	F	P
Between subjects				
Order (O)	3	9.1771	.31	
Sex (S)	1	36.2604	1.23	
O x S	3	22.2882	.75	
Error between	24	29.5590		
Within subjects				
Target (T)	2	1001.3230	74.88	< .01
O x T	6	9.1559	.68	
S x T	2	17.5103	1.31	
O x S x T	6	18.0373	1.35	
Error within	48	13.3716		

Table 6E

Summary of Analysis of Variance of the

Aggression Ratio Scores in Experiment III

Source	df	MS	F	P
Between subjects				
Order (O)	3	.0684	1.79	
Sex (S)	1	.0897	2.36	
O x S	3	.0309	.81	
Error between	24	.0380		
Within subjects				
Target (T)	2	.1783	23.53	< .01
O x T	6	.0172	2.27	
S x T	2	.0175	2.31	
O x S x T	6	.0037	.49	
Error within	48	.0076		

Table 7E

Summary of Analysis of Variance of the

Affect Ratings in Experiment IV

Source	df	MS	F	P
Between subjects				
Order (O)	3	37.5833	2.11	
Sex (S)	1	18.3750	1.03	
O x S	3	41.4583	2.32	
Error between	24	17.8542		
Within subjects				
Target (T)	2	651.5415	34.88	$<.01$
O x T	6	2.5413	.14	
S x T	2	18.4996	.99	
O x S x T	6	2.2494	.12	
Error within	48	18.6771		

Table 8E

Summary of Analysis of Variance of the

Aggression Ratio Scores in Experiment IV

Source	df	MS	F	P
Between subjects				
Order (O)	3	.3291	3.06	< .05
Sex (S)	1	.0624	.58	
O x S	3	.0297	.28	
Error between	24	.1077		
Within subjects				
Combination (C)	3	.1838	11.35	< .01
O x C	9	.0267	1.65	
S x C	3	.0141	.87	
O x S x C	9	.0213	1.31	
Error within	72	.0162		